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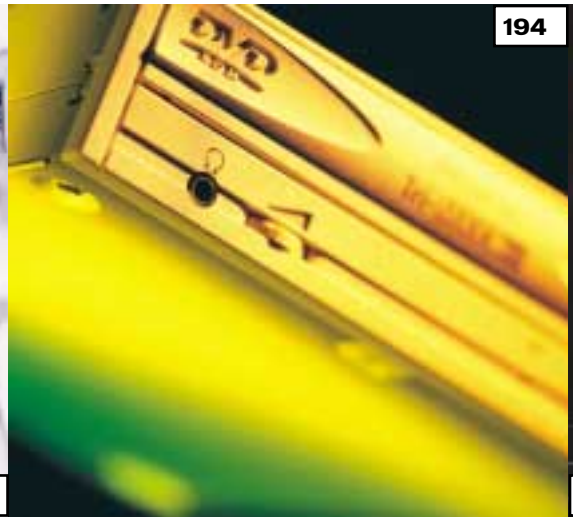

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NEW! BECOME A PCW EXPERT

Every month from the September issue we will be dedicating an extra 16 pages to editorial and tutorials covering one particular subject in depth. By the time you've read this section you will be a *PCW* expert, so order your copy now!

Taiwan is no longer a cheap manufacturing facility but a technological centre vital to the industry.

Practice makes perfect

I'm currently sitting in a hotel room in Taipei, having spent the past few days attending the Computex 2000 exhibition. Computex is an annual exhibition dedicated to the IT industry in Taiwan and it draws manufacturers and distributors from all over the world looking for the latest technology.

As I was entering the main exhibition hall on the first day of the show I spotted an interesting billboard depicting four cyclists all dressed up in full race gear, but with no bicycles beneath them. The caption read, 'Without Taiwan where would the sport be?'. The poster was highlighting the fact that Taiwan produces the majority of bicycle parts in the world.

Although most large, big-name bike firms still keep their research and development labs in the US and Europe, much of the production is done in Taiwan, with only the very high-end equipment being handmade in the West. Add to this the fact that many Taiwanese bicycles firms, such as Univega and Giant, have been gaining critical acclaim across the globe for design and quality and it's easy to see that the sport would indeed be in big trouble without Taiwan.

However, even though the bicycle industry may rely heavily on Taiwan, it pales by comparison to how much the IT industry relies on this small, Far Eastern island. The extent to which this is true is quite scary, especially when you consider that the island suffered a major earthquake last year.

Although most people who follow the IT industry are aware that almost every motherboard is designed and manufactured in Taiwan, it should also be noted that the only serious competitor to Intel's motherboard chipsets is VIA. But VIA isn't limiting itself to motherboard chipsets: on its stand it was showcasing the latest 266MHz SDRAM DDR memory architecture. Like the DDR memory currently seen on graphics cards, these SDRAM modules perform two instructions per clock cycle, dramatically increasing the memory bandwidth. It was also showing off the latest fruits of its takeover of Cyrix, in the form of a Celeron-compatible CPU that it plans to sell for below the already cheap Celeron price point. And whereas the Celeron is stuck with a 66MHz FSB, this latest Cyrix CPU will run with a bus frequency of 133MHz. Although this new chip is aimed at the low end of the market, it's good to see another horse enter the CPU Derby.

But motherboards, memory and CPUs are far from the end of the Taiwanese story. The island is responsible for major volume in graphics cards, networking products, system cases, CRT and LCD screens, PDAs, keyboards, mice, optical drives and notebooks.

Without Taiwan the notebook industry would find itself in dire straits. It's no coincidence that notebooks from various manufacturers all look similar, since the chances are that they all rolled off the same production line in Taiwan before being rebadged by the reseller. Even tier-one giants such as Dell and HP rebadge Taiwanese notebooks, although you'll probably find they'll make cosmetic changes to differentiate themselves from other resellers. And since the tier-one players are investing in these Taiwanese manufacturers, the quality is getting better all the time.

Taiwan is starting to become the hub of the IT industry, with companies such as Acer coming close to being able to build a complete PC using only its own components. Only the CPUs and hard disks aren't produced in-house, although I wouldn't be surprised if that didn't change at some point. Also, the amount of technology companies in Taiwan is staggering, with only a few of the major players currently exporting to Europe. That said, all of the companies I spoke to said that they were working on setting up European distribution. So we can expect to see even greater saturation of the Western IT market by the Taiwanese.

Since the tier-one players are investing in these Taiwanese manufacturers, the QUALITY IS GETTING BETTER all the time

Gone are the days when Taiwan was a cheap manufacturing facility for Western companies. It has now become a major technological development arena in its own right and it's getting stronger each year. So, where would the IT industry be without Taiwan? Probably back in the technological dark ages.

Riyad Emeran, Editor

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August COVER DISCS

GAMES | APPLICATIONS | LIBRARY | ENTERTAINMENT | INTERNET

This month we've got the full version of Serif's powerful yet easy-to-use desktop publishing software package, PagePlus version 4. To accompany it, there's also DrawPlus 2, with all the features you'll need for fast and effective vector-based drawing.

What's more, there's a full unrestricted version of the new AutoStreet 2000 Lite route planner (worth £19.99) and a chance to try out the fascinating new UK-Info Power database of companies and directors, which is available for a free 30-day trial.

PagePlus 4 & DrawPlus 2 — FULL VERSION

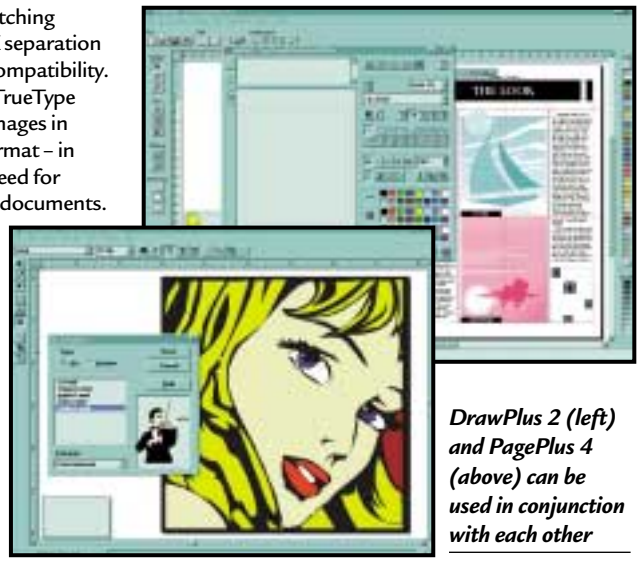
PagePlus has won many awards for its professional features and ease of use. You can do just about anything with this application that bigger, more expensive packages can do and you don't have to be an expert to get great results.

Some of PagePlus 4's features include:

- 200 design wizards
- Powerful layout tools
- Proof reader and AutoCorrect
- 70 import and export files
- Pantone colour matching
- Professional CMYK separation
- OLE and TWAIN compatibility.

You also get 400 TrueType fonts, 3,000 clipart images in Windows Metafile format – in fact, everything you need for producing great DTP documents.

PagePlus 4 is perfect for creating ads and brochures, business stationery, flyers and forms, newsletters, notices and handouts, event programmes, posters, price lists and reports, announcements, invitations, greetings cards, and much more.



DrawPlus 2 (left) and PagePlus 4 (above) can be used in conjunction with each other

DrawPlus 2

DrawPlus is a stunning vector drawing and illustration application that lets you create illustrations quickly and easily, as well as modify and recolour clipart. Features include Intelligent QuickShapes and multicolour blends, making it the perfect complement to PagePlus.

Clipart library

The clipart library included with PagePlus and DrawPlus cannot be accessed directly from the default folder on the CD-ROM or DVD. This is because the installation folders were moved in order to integrate them with the *PCW* menu and the other programs on the disc. To access the clipart from within PagePlus (ie using Import Picture Wizard) you should choose: 'Other Pictures' – 'Windows metafile' then navigate to the folder <CD:>\Software\Serif\Serif\Clipart.

The folders are organised by picture categories and highlighted images are displayed as thumbnails within the file browser.

Serif DrawPlus 4 (MSRP £49.95)

Free registration

If you want to continue using PagePlus after 30 days, then you will have to register. However, you'll have to register DrawPlus straight away before you can start using it. But don't worry, registering the programs is simple and completely free (Serif even pays for the call). Readers simply have to install the software and call up Serif's FreePhone number quoting the product registration code (below) and an installation number (which will appear on the screen after you have installed the software).

Registration codes:
Serif PagePlus 4: PCW/PP4/0800
Serif DrawPlus 2: PCW/DP2/0800
Serif's FreePhone registration line:
0500 454 645

AutoStreet 2000 Lite

FULL VERSION worth £19.

This powerful new routeplanning software covers the whole of Great Britain, using high-quality maps and a very intuitive interface. It will quickly calculate the best route to take and includes some very useful extras, such as a database of all the petrol stations in the country – so there's no excuse for running out of fuel when you're off travelling.

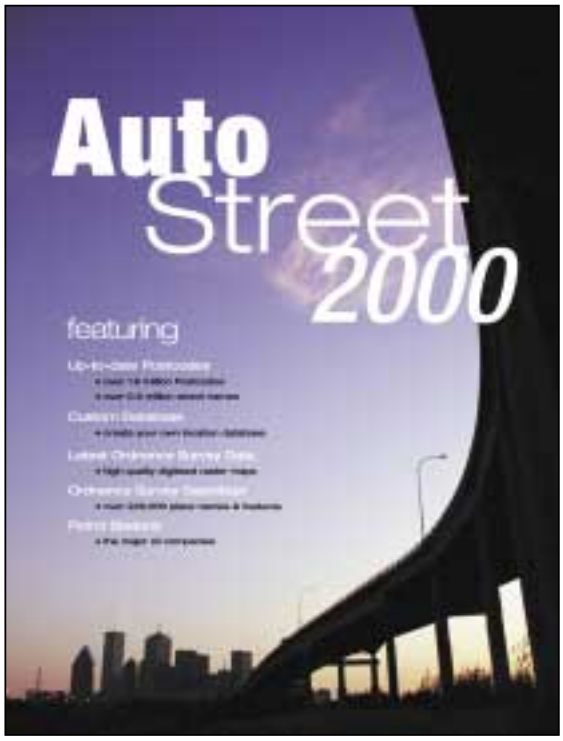
AutoStreet 2000 is unique in that it uses only the very latest Ordnance Survey data to produce its high-quality, high-resolution maps in a software-only product. It uses Year 2000 and 1999 data sets (the latest available) rather than historic 1995 data that is sub-licensed from Navigational Technologies (NavTech). Other companies use this old data in their latest products. The NavTech street data is very cheap but the information can be over five years old and it doesn't have GPS support. After all, many changes have happened to our roads over the past five years.

In the **Lite version** (featured unrestricted on this disc), you get the following features:

- Latest Ordnance Survey map data
- Calculate and display the quickest routes (shortest and cheapest routes in Standard product only)
- High-resolution raster maps
- Five levels of zoom (1:4.5m, 1:1.5m, 1:625k, 1:250k, 1:100k)
- IntelliZOOM technology – draw a box and zoom into nearest scaled map
- Over 220,000 named features & places of interest
- New multidirection and multi-speed scrolling – makes easy work of moving around maps
- Push-pin database of petrol stations or simply create your own.
- Laptop zoom feature – up to 400 per cent zoom magnification for distance reading.

Here's what else you'll get if you **upgrade to the standard version** of AutoStreet 2000:

- Street-level maps within the entire M25 orbital road network
- Full GPS tracking throughout Great Britain
- Seven zoom levels – five routes and two street zoom levels (M25 only). Professional version has ALL streets for the entire Great Britain
- GPS tracking to street level within the M25
- Complete 1.6 million postcode database for the whole of Great Britain
- Address checker and postcode locator
- Latitude and longitude navigator.



Note: box shows AutoStreet 2000 Standard

GPS tracking to street level*

All the other products that use the NavTech data provide street addressing based on 1995 data. However, none of them give you GPS (Global Positioning System) tracking down to street level on a realtime basis. The reason for this is that NavTech produces the majority of all in-car navigational systems. In order to stop a cheap software solution stealing its market it only licenses its software for GPS tracking down to route level rather than street level. However, the publishers of AutoStreet license data directly from Ordnance Survey, which allows for realtime GPS tracking.

Accurate postcode locator*

AutoStreet's Postcode Locator uses a highly efficient algorithm to calculate the best, mean position for each postcode. In this manner the postcodes are actually much more accurate than the original Royal Mail postcodes since an exact latitude and longitude is calculated on a root-mean-square average. This means that all the postcodes on street-level maps are more accurate than any other software product.

(* Not in Lite version)

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Competition

We have teamed up with Garmin, the world's largest producer of handheld GPS receivers, to give away the GARMIN ETREX GPS Receiver to one lucky winner who loads the trial version of the software and enters their details into the FREE DRAW COMPETITION (details on the website at www.auto-street.com). The good news is that you don't actually need to purchase the software to enter.

Full details on the disc.

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CALL FREEPHONE 0800 376 4848 and quote code RO/PCW/0800

Using the cover disc and where to find Hands On

The *PCW* cover disc uses a web-browser-style interface. As well as cutting the time needed for development, content designed for the web can be easily ported to the disc (and vice versa). Compatibility issues are reduced as your browser has been installed to work on your individual PC. However, to get full functionality from it, you will need to use Microsoft Internet Explorer (version 4 or later). This is because we use a special ActiveX plug-in that allows us to install software directly from the browser, without all the options, dialogs and security warnings you normally get. Unfortunately, Netscape doesn't properly support this software. For non-Microsoft users, we've included a small installer that will run when you insert the disc, or when you run the program PCW.EXE in the root of the disc. Of course, you can still launch the main browser to read all about the software on this month's disc.

IMPORTANT

Please note that we cannot give support on individual programs contained on this disc.

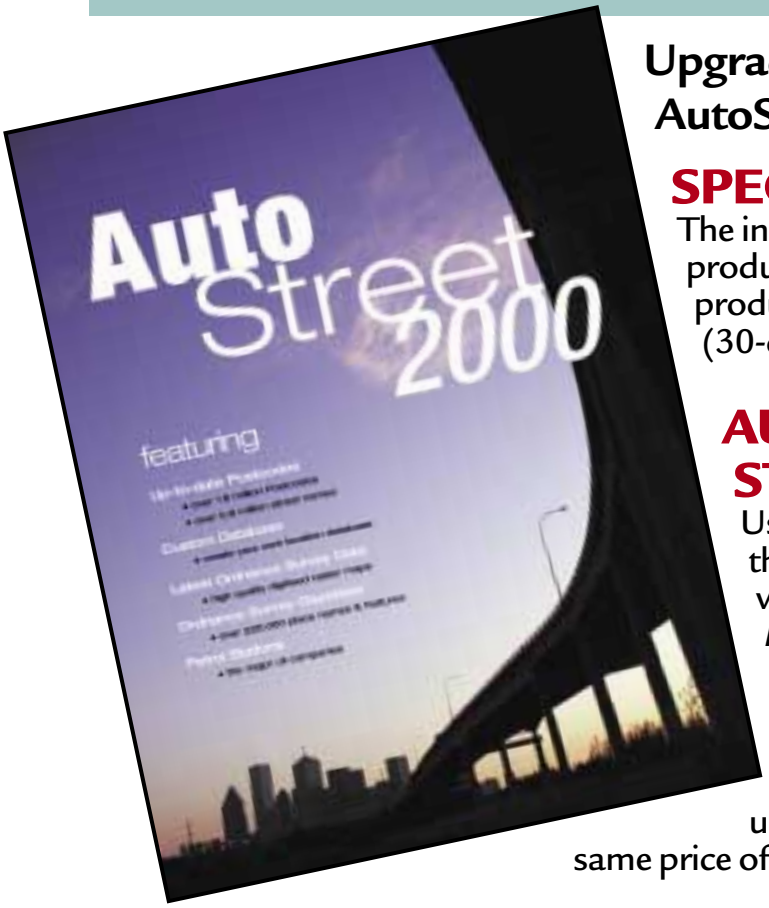
If you have problems running the disc or any of its content, please follow these guidelines:

- Faulty disc (ie, the disc is physically damaged and will not load) – return the disc for a replacement to: PCW August cover disc, TIB plc, HelpLine Returns, Unit 5 Triangle Business Park, Pentrebach, Merthyr Tydfill, Mid Glamorgan CF48 4YB, quoting ref 'PCW Vol 23 No 8'.
- You have problems installing/running some of the software check the support page on the CD, or the support website at www.pcw.vnunet.com/cd. You should also check the manufacturer's website (the details in most cases are given on the CD).
- For general difficulties call 01685 354726
- If you're still stuck, drop us an email at pcwcd@vnu.co.uk – we may be able to help.

Hands On

This is where you will find those useful bits of code and software to save you time and effort when you're following *Hands On* projects from *Personal Computer World* (see the back of this issue for more details). Any *Hands On* files included can be found in the *Hands On* folder on the CD-ROM drive. Also included this month is WindowBlinds. If you're bored with bog-standard looking windows, WindowBlinds lets you customise them.

AUTOSTREET 2000



Upgrade to the full power of AutoStreet 2000

SPECIAL UPGRADE OFFER

The installation on this disc includes two products: AutoStreet 2000 Lite (full working product) and AutoStreet 2000 Standard (30-day trial version).

AUTOSTREET 2000 STANDARD

Users of the Lite version can upgrade to the fully working, unrestricted Standard version for just £23.99. This represents a *Personal Computer World* saving of 20% off the RRP of £29.99.

Similarly, users of the 30-day Standard version trial can upgrade to the unrestricted Standard version for the same price of £23.99.

AUTOSTREET 2000 PROFESSIONAL

Also available is this two-CD product that contains ALL the streets for the whole of Great Britain. This retails at £49.99. But *Personal Computer World* readers can buy it for a special offer price of £39.99, representing a 20% reader discount.

All prices are exclusive of VAT and P&P. Postage & packing will be charged at £3.95. All orders placed via the website www.auto-street.com will **not** be charged for postage & packing, just VAT.

HOW TO CONTACT AUTOSTREET

Phone: 0870 900 1820
International: +44 1273 506 000
Fax: 020 7681 1790
Website: www.auto-street.com

AutoStreet 2000 uses the latest Ordnance Survey and GPS data

UK-INFO POWER

'So powerful the powerful already want it banned'
'Know your customers and business associates'

- **build your business**
- **find contacts – reduce bad debt**
- **save time and money**

There's nothing else quite like it. This unique business database features:

- Information on 2.7 million companies and 3.8 million company directors
- Search for companies by name, turnover, activity, location and director
- Export up to 250 records per search
- Covers the whole of the UK
- Search for directors by name, age, location, company, salary and occupation
- View company/director details instantly, including accounts information
- Allows information to be searched with just partial search criteria and wildcards
- Includes company name, full trading address, parent and ultra-parent company, telephone number, half a million fax numbers, directors' names and home addresses, company accounts, employment band, profit band, company registration number, multiple SIC code descriptions describe a company's activities
- Sort records by any field
- Windows 98/2000 interface design makes it easy and fast to use

Benefits

- Reverse searchable – by using anything from names, street names, door numbers and other criteria you are able to find anyone, in a variety of ways
- Research a company's history, reveal associations between companies, such as common directors
- Research directors and list all company directorships
- Create databases and mailing lists using business criteria, SIC code, line of business, turnover band and employment band
- Research directors' salaries
- Protect yourself from fraud – arm yourself with information on your business partners, competitors, business customers, suppliers, debtors and creditors

DVD ROM™

VERSION ONLY

Upgrade version also includes

- Unlimited access – no timeout
- Street atlas and road directions to companies in Great Britain with Route66

PCW reader upgrade offer

The upgrade includes unlimited access (no timeout) plus street atlas and road directions to companies in Great Britain, provided by Route 66.
You can upgrade saving 10% on the normal price, for just **£206.95** including VAT.
Call the sales hotline: 08000 192 192
Why not visit the InfoPower website at www.192.com?

*Trial version included on the DVD-ROM edition of *Personal Computer World*

What's on the DVD

This month sees the arrival of the first *Personal Computer World* DVD-ROM. If you didn't buy the DVD edition this month, why not look out for it on sale next month? Or you can subscribe to the DVD edition by phoning the DVD subs hotline on 01858 438 885. You can also buy the DVD-ROM separately by phoning the same number – see page 10 for details.

The huge capacity of DVD allows us to include the equivalent of around six CD-ROMs worth of great content. In addition to the programs on the CD, we've got six months worth of product group tests from *PCW* in PDF format, a new Games section and much more.

Lotus SmartSuite 97

It's been around for a while now, but this professional office suite from Lotus still offers some powerful applications with a great set of Internet features.

SmartSuite comes with no fewer than five closely integrated pro-quality programs:

- WordPro word processor
- Approach – easy-to-use database
- 1-2-3 – groundbreaking spreadsheet
- Organizer – award-winning PIM
- Freelance – graphics & presentation

NetObjects Fusion 2

One of the top names in website development. Fusion encourages a structured approach to planning and executing your website that will save you time and effort in the long term. Check out the NetObjects website for information about the latest version of Fusion and other great NetObjects products.

Guardian Century CD

100 years of history from *The Guardian* with the BBC World Service. Look back on the century that's just passed, through news stories of the time. *The Guardian* Century makes fascinating reading and you'll also find many high-quality photos and audio clips to accompany the stories.

System requirements: Pentium or faster; 32MB of RAM; Windows 95, 98, or NT; 800 x 600 16bit colour display

UK-Info Power – 30-day trial

This is your chance to try out in full for 30 days, the New CD-ROM business directory that is 'so powerful the powerful already want it banned'. UK-Info Power contains information on 2.7 million companies and 3.8 million company directors. You can search for companies by name, turnover, activity, location and director, and export up to 250 records per search.

The data includes company name, full trading address, parent company, ultra-parent company, telephone number, half a million fax numbers, directors' names, directors' home addresses, company accounts, employment band, profit band, company registration numbers, multiple SIC code descriptions describe a company's activities.

PCW readers can upgrade to the full version at a special discount price. Check the upgrade offer on page 20.

Atlantic Business Suite

A complete solution to project and resource management. The system consists of three powerful applications, Timesheet Expert Server which offers comprehensive timesheet management. Timesheet Expert Web, which extends the functionality of the timesheet software and project management tools to the Internet, and Atlantic Projections, a project management tool which provides project and resource scheduling and completely integrated project and timesheet management.

PLEASE NOTE the first time you run the software you will be asked for a user name and password. Enter 'Supervisor' as user (leave the password field blank).

Games

Check out some of the latest playable games demos, including:

- Dogs of War (pictured)
- Rollcage Stage II

- Hidden and Dangerous
- Thief II – The Metal Age
- Shadow Watch
- Resident Evil 2
- Star Trek Klingon Academy
- UEFA 2000
- Evolva
- Die Hard Trilogy 2

Essentials sections

This is where you'll find all those utilities, updates, and accessories you just can't do without. Split into Internet, Office, Creative, Utilities and Other, plus the Library selection from our own vnunet downloads website, you'll find more than 50 great programs. We'll be adding to and updating this section as time goes on, so you'll know where to go to get the latest versions.

Editorial

In addition to the *Hands On* files and utilities mentioned in the magazine, you'll also find six months worth of product group tests from *PCW* in Adobe Acrobat format. This month we've got 18 group tests covering printers, monitors, motherboards, PCs, databases, anti-virus software, CD writers and much more.

Starting the DVD-ROM

The DVD should auto-start, just like the CD. If it doesn't, double-click the DVD-ROM icon in My Computer or, alternatively, run the file PCW.EXE on the root of the DVD. Check out the support website at **www.pcw.vnunet.com/cd** for late-breaking news on the programs on the disc.

Send your news and views to news@pcw.co.uk

news

edited by Clive Akass

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Smart Psion radios could steal 3G mobile's thunder

Psion is redefining the portable radio in a move that mirrors the convergence of the PC and digital TV. It plans to pack Digital Audio Broadcasting (DAB) support into a handheld computer, opening up possibilities far beyond high-quality audio on your PDA.

The BBC has invested massively in DAB, a Europe-wide standard, and is already running test services. The technology was developed mainly to improve car-radio reception, avoiding the fading of analog signals and doing away with the need for retuning as you travel.

But what is good for car radios is also good for other mobiles. The data content of a DAB channel is limited to 20 per cent, but that still leaves 300Kbits/sec. This compares with a theoretical 2Mbits/sec for UMTS, the third-generation (3G) mobile system.

In practice, UMTS data rates will perhaps be as low as 200Kbits/sec. 'The DAB signal is far more robust than UMTS and the infrastructure is far cheaper to roll out,' said Geoff Kell, commercial director of Psion Infomedia, a new division that is developing the technology.

DAB receivers have been prohibitively expensive – some early models cost more than £2,000. Psion Infomedia will launch a PC DAB card called Wavefinder later this year that will be 'significantly cheaper than anything else on the market.'

This will exploit the uses of DAB, such as the ability to supplement adverts with web links and order forms. 'You will, for instance, be able to buy a piece of music directly after listening to it,' said Kell.

Exciting possibilities will arrive when DAB is married to next-generation handhelds using Symbian's new comms-friendly operating system. Kell says it will complement 3G data services, which could be used as a back channel for requesting information.

'When the last World Cup was on, someone was giving regular updates to mobile phones using SMS. It got so popular when England was playing it crashed every SMS server in the country. DAB is a far better way of doing this.'

It is hard to see how DAB will not cut into revenues of mobile operators who expect local information to be a big money spinner. There will be nothing to stop DAB local radio stations dumping similar data to handhelds in their area.

The BBC is already using DAB to broadcast the 30 top pages of BBC Online.

CLIVE AKASS

BT rings businesses first

Businesses are to get first use of BT's fast GPRS mobile and ADSL services – with home users not getting a look in until the year's end. BT fleshed out details of the rollouts as some of the new unmetered dialup services were overwhelmed by the demand for subscriptions and line time (see page 36).

There were mixed signals about packet-switched GPRS which will give mobile users a nominal 64Kbits/sec wireless link – a speed that in fact will be as low as 14Kbits/sec as users compete for bandwidth.

There were rumours that this would not appear until next year. But BT Cellnet is to provide corporate customers with handsets this month to allow them to be integrated into enterprise systems.

The £99.99 business version of ADSL, will be available from about the time you read this. This gives 500Kbits/sec upstream and 250Kbits/sec down.

Services initially are still regarded as being on a trial basis – and from Gordon Laing's experience (see page 50), BT still seems to be going through a learning process.

Business subscribers will get a router with ports for four devices enabling instant access to a network. For £39.99 a month home and small-business users will get a USB link with a higher number of users per channel.

More details on page 51

Silicon Graphics International (SGI) showed its PIII-based 230 workstation at Linux Expo 2000. This graphics workstation offers high performance at PC prices by combining accelerated VPro graphics with standard components.
www.sgi.co.uk

Short stories

QUANTUM KEYS

A new quantum device can tell if information has been illicitly read in transit on optical fibre, researchers at Cambridge-based Toshiba Research believe. It uses semiconductor dots, nanometres across, set in a transistor lattice that can detect a single electron displaced by a photon impact.

Data in the emerging field of quantum communication is encoded at the single photon level. The quantum state of a photon cannot be measured without it changing; so any eavesdropping can be detected. The system would allow users to exchange encryption keys for secure communication.

JOHN LEYDEN, VNUNET.COM

PRINTER GIVEAWAY

HP is giving away £170,000 worth of its multi-function LaserJet 1100A machines to anyone still using its original 16-year-old LaserJet, LaserJet Plus or LaserJet 500 Plus. It says this is to reward users' loyalty. However, production of cartridges for the old models will cease on 1 November.

To claim a new printer call 00 800 23 624 624 or email exchange_hotline@hp.com.

MACOS X DELAY

Apple has delayed the launch of MacOS X, its next-generation operating system, until January – although a public beta will be available this summer to allow developers to have applications ready when it ships.

The new OS will support Java 2, OpenGL and is integrated with Microsoft's Internet Explorer browser.

A new version of the QuickTime media player with cross-platform support for MPEG 1 and 2 decoding and encoding will debut this summer, chief executive Steve Jobs told the Apple Developers' Conference in San Jose.

Intel 820 jinx strikes again

Intel faces another expensive and embarrassing bug fix on boards that are using its problem-hit 820 chipset.

The launch of the 820 was delayed last year because of problems accessing expensive RAMBUS memory (RDRAM). The latest problem, according to Intel, stems from the Memory Translator Hub (MTH), which was introduced to allow the 820 to access cheaper SDRAM memory.

The hitch came to light when a user discovered that the MTH was susceptible to system noise.

This can result in intermittent reboots or hangs, with the potential for loss or corruption of data. It does not affect boards fitted with RDRAM.

The MTH is used on all 820 motherboards that support SDRAM, including Intel's own CC820.

Anyone with this board is being offered either a refund or a VC820 motherboard – complete with 128MB of PC700 or PC800 RAMBUS memory. If you have an 820 motherboard contact your supplier for details.

Intel says recall costs are impossible to calculate until it knows how many people will choose the replacement rather than the refund. Asus and Gigabyte say they will both follow Intel's lead.

At the time of writing, 128MB of PC800 RAMBUS memory cost £471 ex VAT from jungle.com.

For those who are not sure what chipset is inside their machine, Intel has released a program, available in Windows and command-line versions, to detect its presence.

Details of the bug, and an 810KB utility that will test which chipset your board uses, are available at www.intel.com/support/mth

It's not all over for the MTH, though – Intel is working on a version that does not suffer from the same problems, set to ship with 820 and 820E boards in the third quarter of this year.

JASON JENKINS

Magellan claims this £115 ex VAT Global Positioning Satellite (GPS) receiver is the first at its price to support the NMEA interface standard, allowing it to link into navigation software on a portable computer. You would buy a £26.95 ex VAT interface to make the connection.
Next Destination 01722 410 800

Stac becomes Previo for flagship launch

Stac, whose disk-doubling software was famously 'pirated' by Microsoft, has changed its name to Previo to launch the latest version of its flagship eSupport Essentials.

The company won a £75m settlement after something remarkably similar to its Stacker software, which compressed and decompressed data on the fly, turned up in Microsoft's DOS 6.0 operating system in 1993.

(Life has its little ironies: Microsoft threw a press party this month to highlight the problem of piracy).

Quite what was wrong with the name Stac is not clear. CEO John Ticer said: 'We felt the need to reinvent ourselves.'

In fact, eSupport does build on Stac's compression expertise. It backs up configuration details of a company's PCs, laptops and mobile so users can have their familiar working environment restored after a crash.

Cost of the Baby Bills

A delayed unveiling of the next-generation Microsoft services was the immediate effect of the long-expected court ruling that the company be split into two 'Baby Bills' – one developing operating systems and the other applications.

Appeals could drag on for two years and the consensus in the industry, beyond companies that have been gunning for Microsoft, seems to be that whatever the justice of the ruling it will do little for IT.

Rival software houses will welcome the fact that Microsoft has to make new OS versions available to all developers at the same time. Microsoft has been repeatedly accused of giving its own application coders an edge with early access and secret 'shortcuts'.

Some PC makers will welcome curbs on preferential pricing that puts small vendors at a disadvantage. Microsoft is also barred from 'discouraging' the use of other operating systems.

More controversially, vendors are free to set their stamp on pre-installed copies and Microsoft is barred from tying other products into the operating system. This begs the question of what an OS is: Microsoft is not alone in arguing that it should incorporate the browser.

If Explorer is separated from Windows, we could find ourselves having to pay for the browser in future.

Chief executive of Microsoft Steve Ballmer claimed the court ruling would prevent 'any enhancements to Windows in the Internet area for three years'.

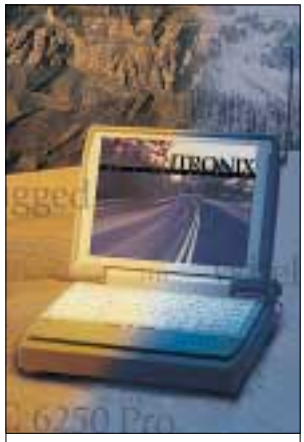
When Microsoft does bundle extra software with Windows it has to provide an uninstall mechanism and adjust the product price to vendors who choose not to include it.

This seems to have been the reason Microsoft delayed unveiling its Next Generation Windows Services (NGWS) that are intended to marry its web software to emerging access appliances. As we went to press the launch had been rescheduled for 22 June.

There are fears that there will be a brain drain from Microsoft as the uncertainty drags on and prices of shares, on which staff have options, stagnate.

Outside the company, the major fear is that the Windows standard will be diluted. Analyst Simon Moores, chairman of The Research Group, said Windows offers businesses a 'degree of comfort and consistency' available with no other operating system. 'It's expensive, and control of the standard has not always been wielded in the best interests of the customer. But still it has given us a platform on which we have seen the world change,' he said.

For more reaction to the case, point your browser at www.vnunet.com.



Itronix, which bought UK industrial notebook specialist Husky early this year, claims this rugged X-C 6250 Pro is the first of its kind to integrate GSM wireless connectivity. Prices range from £3,500

SURFERS SCARE BOSSES

More than three in four UK firms check what staff get up to on the Internet, a new study says. They fear that people who send insulting emails or download pornography could land them in court.

The study, by employment research specialist Industrial Relations Services (IRS), also found that companies are increasingly worried about the amount of time staff might waste by surfing the web.

A study by NetData reckoned that that such 'time wasting' could cost companies with 3,000 employees or more as much as £10m a year.

VNUNET.COM

Love affairs, insults, mucky pictures... there's so much time wasting for the boss to check up on, he can't get any work in

New PowerVR chips into graphics battle

Imagination Technology (formerly VideoLogic) has tossed its hat into the graphics card ring once more. Hot on the heels of nVidia, ATi and 3dfx, Imagination has released details of the PowerVR 3 chip. PowerVR was seen as a competitor to 3dfx's Voodoo chipset back in 1996, but it failed to excite the public or press. PowerVR 2 was a similar disappointment on the PC, but was a lucrative success in the Sega Dreamcast console.

The new PowerVR 3 chip, christened Kyro, represents the first fruit of a joint venture between Imagination and STMicroelectronics (formerly SGS-Thompson Microelectronics). ST launched the chip at Computex in Taipei on 5 June and production boards should be available soon.

Kyro chips will speed up performance

Kyro includes many of the latest features including hardware environment bump mapping and full-scene anti-aliasing. Its most cunning feature is the ability to render only what is visible in a scene, speeding performance by ignoring detail that is hidden behind other objects. This also uses less memory bandwidth and means that SDR memory can be used instead of DDR, which helps to keep the cost down.

How it works in practice remains to be seen. We will have a full review of a board in the next issue.

RIYAD EMERAN

POSTCARDS FROM...

Clive Akass in *Dresden, Germany*

AMD will launch a new version of its 'Thunderbird' Athlon late this year (see story right) with up to 1MB of on-chip cache, the company said as its fab (pictured above) went into production for the first time.

Slated to launch at much the same time is a mobile Athlon codenamed Corvette; the 64bit Sledgehammer will ship next year.

There could be some confusion over the latest Athlon, with its 384KB on-chip cache (including Level 1) because it comes in both Slot A and Socket A versions. The former, which will quickly be phased out, will be sold exclusively to PC makers that want to use up stocks of Slot A motherboards.

But only a yellow sign saying 'with performance-enhancing cache memory' will distinguish it from an old, cheaper Slot A Athlon. Prices of the new version range from £200 for a 750MHz to £618 for a 1GHz.

The new Duron chips (see p77), which will compete with Celerons in the budget market, will cost £70 for a 600MHz, £96 for a 650MHz, and £120 for a 700MHz.

The new fab could avoid supply problems that AMD has suffered in the past. Manager Jim Doran says it is already producing 'hundreds of thousands' of chips and will be shipping millions by the end of the year.

He claimed that it would go a long way towards meeting AMD's aim of being able to supply 30 per cent of world demand.

Riyad Emeran reports on AMD and VIA launches, from Computex in Tapei.

Thunderbird chips are go...

The first manufacturer to ship a production AMD Athlon board last year proved that it's still at the cutting edge when it comes to AMD's latest technology. Gracing the MSI stand at Computex was an AMD Athlon Thunderbird running with a clock frequency of 1GHz.

The previous 1GHz Athlons were Slot A based and only sported 1/3 speed Level 2 cache. This meant that the Athlon's cache was only running at 333MHz compared to 1,000MHz on the Intel Pentium III Coppermine CPUs.

The balance, however, has now been redressed with this socket-based Thunderbird Athlon boasting 256KB of full-speed Level 2 cache, just like the Coppermine PIII.

MSI was showing off the new super-chip in its K7T Pro motherboard, based on the VIA KT133 chipset. This board supports 133MHz SDRAM, which addresses the 100MHz memory limit problem suffered by the first-generation Athlons. Whether this latest chip from AMD will outperform the 1GHz PIII remains to be seen, but it does prove that the race for the fastest x86 CPU is far from over.

...as K6-2 gets mobile

Proving that it can compete with Intel in the mobile as well as the desktop market, AMD showed its new notebook processor. The latest incarnation of the K6-2+ features AMD's PowerNow! technology.

Like Intel's SpeedStep technology, PowerNow! uses voltage and CPU frequency variance to extend the battery life of a mobile computer. Unlike SpeedStep, however, PowerNow! is not an on or off solution. The CPU voltage varies from 1.4v up to 2v depending on the system load at the time.

If the notebook is almost idle, the CPU will run at 200MHz with a corresponding voltage of 1.4v. But if an intensive application is fired up, the voltage will jump to 2v and the CPU frequency will rise to 500MHz.

The PowerNow! functions can be active whether or not the notebook is running on battery power. If, however, you don't want the auto-sensing speed changes, you can force the chip to run in 'maximum battery life' or 'maximum performance' modes.

The model we saw was a 500MHz chip, but there are already faster CPUs available. But whether Intel should start worrying depends on how quickly AMD can produce the parts in volume.

Notebooks use Crusoe – p40.

VIA Cyrix III aimed at budget PCs

Taiwan chipmaker VIA launched a range of Cyrix III processors running at between 533MHz and 667MHz. The chips, costing £47-£100, are targeted at the budget PC market.

VIA has been taking some of Intel's market recently because its chipsets support fast SDRAM at a time when rivals from the US giant were hit by problems with expensive Rambus memory.

Most analysts believe that VIA has a long way to go before it can challenge Intel on processors and its edge on chipsets will erode with the imminent release of Intel's 815 chipset which supports a 133MHz bus.

VIA bought the Cyrix name and technology from National Semiconductor last year, but the new chip is said to be based on designs it bought from IDT. VIA also has a controlling interest in graphics specialist S3 and is expected to launch a processor with on-chip graphics.

www.via.com

Short stories

EYE OF THE BEHOLDER
The computer has finally become a fashion accessory. This outfit from Californian firm Charmed is one of several prototype wearable computing devices set to appear on the market later this year. It was unveiled at the recent Internet World 2000 in London.

STAYING CONNECTED
A new dialup utility claims to make easy work of connecting to the Internet and prevents you from being cut off during idle time. Other features include speed and time monitoring and automatic reconnects. But what really makes this software so different is that it's Russian. HiDialer 2000 costs around £15. A trial version can be downloaded from www.kgsoft.com.

TAPPING INTO WIN2K
Patches for Windows 9x and NT 4.x will enable companies to exploit Windows 2000's improved desktop management features without needing to install the new operating systems on workstations. The extensions, which are due to ship from 17 February next year, will allow desktop PCs to search for user profiles, printers and other objects via Windows 2000's Active Directory.

Toll-free access in turmoil

Teething troubles have continued to hit unmetered Internet links – though many users are said to be delighted with the service. (See our parent site at www.vnunet.com for the latest on the deals.)

Most problems stemmed from overwhelming demand from users and prospective subscribers. Complaints were mostly about timeouts, sign-up delays and engaged tones.

Users were warned to read the small print on their service agreements. Tiny Online cuts out after an hour, for instance, and LineOne after two hours, regardless of whether or not the line is in use. However, users can reconnect immediately – if they can get through.

Other operators have a 'no activity' timeout – as short as 10 minutes in the case of VirginNet's unmetered trial. Some software will simulate activity to deter this (see short stories left).

BT Internet, which unveiled a three-tier business version of its Surftime offer, has a 'fair use' clause enabling it to cut off users who are deemed to be hogging bandwidth. Grant Broster, head of BT Internet for business, said: 'This is a grey area. Obviously we want to provide as good a service as possible for our users.'

BT is one of the providers that allows unmetered ISDN access. Currently this is only via one 64Kbits/sec ISDN channel but Broster says work is under way to allow users to aggregate two channels.

LibertySurf, the new name of another toll-free pioneer, X-Stream, was so overwhelmed by subscribers that it was forced to suspend sign-ups. The biggest strain was on its free helpline, one of its major selling points.

'People were ringing up with queries that had nothing to do with the service,' said a spokeswoman. She said more people were being hired to cope with the demand but she could not say when sign-ups would resume.

LineOne also received complaints about poor service, though a spokesman denied that it had stopped taking new subscribers. 'We had some problems but now if you look at the discussion groups our users are very happy with the service,' he said.

Broster: 'Fair use' clause enables BT to cut off users

Frustrated customers complained of waiting weeks to get linked to NTL's unmetered service, which is free to users in its franchise area and requires others to spend £10 on voice phone service. Some users have claimed that priority was being given to these paying customers.

NTL stopped advertising the service but denied that this was under pressure from the Advertising Standards Authority (ASA). 'We have spoken to the ASA in recent weeks and I believe it is quite happy that we warned customers that they face long delays,' said a spokeswoman.

Oddly, AltaVista, which set the toll-free bandwagon rolling in March by announcing plans for a service, was one of the slowest to come up with a firm offer: a £59 inc VAT sign-up fee, with no monthly charge or minimum spend regardless of which telephone operator you use.

Additional reporting vnunet.com

Prices set to fall following Oftel ruling

Unmetered prices should get cheaper following a decision by watchdog Oftel forcing BT to offer unmetered bandwidth to rivals.

Current services are based on a wholesale time-based version of BT Surftime rates, which BT offered earlier this year after complaints were made to Oftel. However, MCI WorldCom, which owns UK infrastructure provider UUNet, complained that this was still anti-competitive. Oftel ruled in MCI's favour.

To comply fully BT will have to allow rivals to put boxes in local exchanges, because of the way billing is spread across the network. The telco has until the end of the year to make the changes.

In the meantime it must charge providers around £425 a month for 64Kbits/sec unmetered – the level of service will depend on how many people service providers think should share this bandwidth.

But WorldCom's regional affairs director, Richard O'Brien, said: 'We have won a significant victory for users.'

However, Kyle Lamb, of the Campaign for Unmetered Telecommunications, predicted that BT would try to delay implementation.' They are already trying to wriggle out of it,' he said.

Instant messaging services are flooding onto the market in anticipation of massive uptake.

Free phone calls will change lives

Vendors are rushing out products to cash in on an expected boom in instant messaging services and web telephony, which in theory allows you to call free to anywhere in the world.

The boom, triggered by unmetered and always-on data connections, will eventually have a profound effect on the revenue streams of telcos like BT. The prospect of the boom lay behind AOL's battle to prevent its instant messaging service from working with rivals from Microsoft, Yahoo and others.

Most of these services offer, or will offer, voice and video links as well as text-based chat. They differ from email in offering realtime communication, enabling you interact with a group of friends almost as if you are in the same room. They are likely to have considerable social effects as bandwidths increase, transforming in particular the lives of people isolated by age or illness.

Voice-over-IP, by which speech is packetised and sent like any other web data, is much used to carry voice traffic on corporate data networks. Across the wider web, conversations currently sound like mission control talking to the moon, with long pauses and broken voices.

This is because IP4.0, the current version of the protocol, was not designed for time-critical data. IP6.0, which should be in widespread use within a couple of years, copes better by setting priority levels for packet deliveries.

Instant messaging could bring family and friends closer together

Four new products, all claiming improved voice quality over the web, were launched in May by vendors anxious to jump on the band-wagon before it gathers pace.

Affinity Internet Holdings, which claims more users in the UK than AOL through client services like Tiny, Breathe.com and Arsenal, jointly launched US-based Visitalk's messaging client. This allows video, voice and text calls anywhere in the world and will shortly allow PC-to-phone connections to some destinations. It also supports videoconferencing and whiteboarding, allowing remote users to share a virtual drawing board.

It claims to be the first to offer a global directory, allowing you to contact anyone in much the same way as you look up someone in a phone directory. You can download a client from www.visitalk.com.

Another service, PC2Call, allows global calls from a PC to a phone at greatly reduced rates to people who register at its site (www.pc2call.com) – you don't need to download a special client. Managing director Hervé Mary claims the quality is as good as that on a mobile phone. Calls in Britain are free as an introductory offer.

Soon after came Go2Call (www.go2call .co.uk), which offers a thin client providing free PC-to-PC calls between the US, Ireland, and the UK. Already established with similar services is Net2Phone (www.net2phone.com).

HearMe launched with a slightly different approach. You can download its client at www.hearme.com for PC-to-PC connections and PC-to-phone services will follow. You can also license the technology to allow conversations with, or among, website visitors. This can be used for conference calls, support desks, tutorials, call centres or (may the saints preserve us) Karaoke-style singalongs.

GRAPHICS

What's in an image?

Fractal compression, invented by US-based Englishman Michael Barnsley, has always seemed to occupy some shadowland of its own between pure mathematics and magic. It exploits the fact that life itself is fractal, which is to say that shapes repeat themselves at different orders of magnitude – and fractals, though infinitely complex in appearance, have very simple mathematical descriptions.

Images are analysed for their fractal components and stored as a set of coefficients to simple fractal equations. These numbers, unlike bitmaps, bear no obvious relation to the source image. Yet when the equations they represent are iterated – that is when the result is repeatedly fed back as a starting value – they can recreate the image.

Barnsley's company Iterated Systems sold a number of products based on the fractal .fif image format but it never gained wide acceptance, perhaps because compression required so much processing power. But the technology is now being applied in new ways.

An odd feature of fractal decompression is that you can keep iterating the equations until you get definitions far beyond those of the source image: you can put in detail that isn't there. This isn't as outrageous as it sounds: our brains do it all the time. If we see green on a tree we register leaves even if we can't see them: because we know what one leaf looks like we know roughly what they all look like. Fractal enhancement is said to be much better than standard techniques of inter-polating extra pixels based on the values of their neighbours.

Fractals... repeating patterns at different scales

AltraMira has licensed the idea for a series of Adobe Photoshop image enhancement plug-ins. Iterated Systems has just launched into the UK a new enterprise-scale image management system called MediaBin, used by, among others, Ford. This uses standard formats rather than fractal files for storage because, said marketing vice-president Burton Smith, 'we decided our customers did not want to cope with yet another file type'. At around £35,000, you wouldn't buy it for your home PC. But you may find yourself using one of its party tricks: a search engine that can find images by appearance as well as keywords.

If you want a picture of a cow, all you need to do is show it what a cow looks like. You can also find a picture that looks something like what you want and say 'find others like this'.

Interated Systems has teamed up with Wham Tech to bring these facilities to the web in what is being called a next-generation Visual Search Engine, which will cache non-pornographic images from sites across the world. It is expected to be up and running by 2002.

Smith says it could also be used for tasks such as porn-filtering – though it would be hard to distinguish between smut and, say, medical illustrations. But you get this with text too, as AOL found when it banned the word 'breast' and was flooded with complaints from women wishing to discuss breast cancer. CLIVE AKASS

www.wholeimage.net
www.mediabin.com
Iterated Systems UK
01344 761000

Short stories

PC CARDS DROP IN PRICE
Demand for some multi-function PC Cards has fallen because many notebooks now have an inbuilt modem. This 10/100Mbits/sec network interface card, for CardBus slots, costs just £42 ex VAT. Buffalo 01753 677545

ONLINE TAX DRIVE
Small business are to be encouraged to file their VAT and PAYE returns on the Internet. HM Customs & Excise will launch an efiling campaign this September highlighting the benefits of sending returns electronically when the scheme launches next April. Small businesses that file their tax electronically will get a £50 discount for each return. They may also get more time to pay.

OS/2 DEATH
IBM's OS/2 operating system looks set to go the way of all flesh from next year. The company says no more client fixes will be released from 31 January and for servers from 31 May. Updates for Workspace On Demand will cease on 31 January 2002. Support will continue in what IBM called a 'special-bid, fee-based' basis.

BORLAND DEAL OFF
Corel's proposed £668.75m purchase of software tools specialist Inprise/Borland has been cancelled 'by mutual agreement'.

Crusoe laptops on show

As we went to press, a number of notebooks using upstart Transmeta's Crusoe battery-saving chips were expected to be on show at New York's giant PC Expo.

They will include machines from IBM, Compaq and Gateway. Transmeta, which employs Linux guru Linus Torvalds, launched two Crusoe chips in January. The chips use a Very Long Instruction World (VLIW) architecture requiring far fewer chips than standard processors and thus drawing much less power (see *PCW*, April, *News*, p38).

But their performance is lower at any given clock rate because of the need to translate standard PC instructions. However, the company argues that this does not matter, as processing speeds currently exceed the needs of most users.

Crusoes draw between a few milliwatts to 2w, which compares with a minimum 6w for a mobile Intel or AMD chip. National Semiconductor claims to have made an x86 chip 'typically' drawing around 1w.

Gateway, which will use Crusoes in a webpad device, and AOL are among a group of investors that have injected £55m into Transmeta.

Some of the models on show at PC Expo will be prototypes and some will be in production, said Transmeta. First International Computer, which will show an Aqua Webpad, based on a Crusoe 3200, says it will enter volume production by November.

IBM is manufacturing Crusoes and will show a Crusoe-based Thinkpad 'as a technology demonstration', but is considering putting one on the market late this year, a spokeswoman said.

Brian Hurst, director of worldwide sales for Transmeta, said that three new Crusoes will be released shortly: the 3300 and the 3400, both aimed at the appliance market, and the 5600 for use in notebooks.

Spyglass gives Mosaic mobile look

Net oldies will remember Mosaic as the first widely accepted graphical browser that transformed the Internet from a private domain for propellor heads into a mass medium. It was perhaps the most influential piece of software since the first spreadsheet.

Netscape, which gave jobs to most of Mosaic's student designers, was forced to drop the name Mosaic for its commercial browser.

Spyglass licensed it and used the name for a series of embedded browsers. Pictured is its latest incarnation, Spyglassmobile, which was shown off at Internet World. Next to it is the same information as it appears in a WAP browser.
www.spyglassmobile.com

Surf the web prior to take-off

Finally there's a reason to visit Ottawa, in Canada. Laptop users visiting the airport can rent or buy a PC Card that lets them access the web while they wait – at 2Mbits/sec.

The Nokia Wireless network card works anywhere in the airport – I tested it in the 'bathroom', although I did get some funny looks. The £7.50 rental fee is good for the entire time you're in the airport.

The system comes from a company called Skylink, which demonstrated it using a video stream from Bloomberg TV and the quality is amazing. Apparently, the link is ADSL from the access point.

You can also buy the card for around £150 and then you only pay £17 for 300 minutes online. Ottawa has the only fully working system, but at several airports in the US, including Chicago, the system itself is working, although the billing software doesn't yet. So free Internet access is yours for the taking for the time being.

Skylink plans to expand into hotels and railway stations too. But it has yet to find a way round the scarcity of mains power points at airports, which means laptop users might have to drain their batteries.

JONATHAN SAVILL

www.skylink.ca

SPEECH RECOGNITION

Speech devices strike a chord

Two of the world's leading speech-recognition engines are to be merged following Lernout and Hauspie's takeover of its arch-rival Dragon Systems, provided shareholders agree to the deal, which would make the company global market leader.

In the short term L&H's Voice XPress and Dragon Naturally Speaking products will be sold and supported separately, L&H president Gaston Bastiaens told journalists at his Ypres, Belgium, headquarters. 'Eventually we hope to combine the best in both engines,' he said.

He claimed the latest Voice Xpress, version 5.0, is up to 30 per cent more accurate than its predecessor thanks largely to a hesitation filter which recognises and cuts out your 'ums and ahs'. A UK version is due to ship about the time you read this.

Dragon uses purely statistical methods for its recognition, whereas Xpress tries to take account of meaning and context, but neither is good enough yet to see off the keyboard. Nor, come to that, are rival products like IBM's ViaVoice and Philips' FreeSpeech.

But many people, particularly poor typists and the disabled, take to them and, given specialist dictionaries, they are said to sell well to the likes of lawyers and radiologists whose work has traditionally involved a lot of dictation. L&H has also just bought Dictaphone in a bid to tie up this market.

Most of its revenues still come from niche applications such as voice-response systems where speech recognition is a lot more effective because it needs only a limited vocabulary – it does not take much to distinguish, say, a yes from a no. Rivals in this field include UK-based Vocalis (see box).

This work also uses L&H's RealSpeak text-to-speech translation product which can be used to read out email and news reports – it is the voice behind Press Association's Ananova virtual newsreader at www.ananova.com.

Eerily, the technology can use any voice as its model so you could set up a website or voice-response system talking with the voice of a 'virtual you'.

Closely related is L&H's work in machine translation, for which it sees a huge market, particularly in the Far East, as web usage increases globally. Websites can be enabled for on-the-fly translations which are good enough to catch the gist of the source content. You can also email material to L&H for translation by native speakers.

Florita Mendez, president of globalisation and Internet translation, says this is particularly important for business letters where translation may need to be cultural as well as linguistic: 'What may sound right in English may sound extremely rude in Chinese.'

Multinational companies with scattered staff speaking many languages can license translation services and constitute one of L&H's big markets. Mendez says machine translation can be very effective for tasks like multi-lingual manuals because they can be written from scratch to facilitate it.

Handhelds using compact speech recognition and translation engines are expected to evolve from talking dictionaries to handheld translators but, judging from some of the output of current speech recognition products, you can expect some surreal, even dangerous, conversations.

CLIVE AKASS

Vocal talents

Cambridge-based Vocalis' SpeechMail is used by service providers to access email via a telephone. Its sister product, SpeecHTML, provides similar facilities for web pages, allowing companies to offer voice portals. Demos are available at www.vocalis.com.

Voice-driven handheld set to launch this year

L&H has been showing off its prototype voice-driven personal digital assistant called the Nak, versions of which could be on sale by the end of the year. It is about the size of a mobile phone, with a directional microphone at the bottom and a pen screen, which can be slotted out of sight when not in use (see picture). L&H said it expects most interaction with it will be by voice rather than by pen.

Nak, driven by a 207MHz Intel StrongARM processor, uses L&H's latest Voice Xpress version 5.0 speech recognition software with its RealSpeak text-to-voice converter. E-mails can be accessed through verbal commands, with RealSpeak reading the messages aloud. Voice Xpress translates dictated replies into text for sending.

Nak also uses what is being termed 'ambient intelligence', a store of information about the user which it can draw upon when fetching information. For example, if you ask it to find out what the traffic is like and you have told it that you live in Edinburgh, it will find the appropriate local information for you.

The demonstration was impressive. However, the big question is whether the expectant silence that accompanied it affected the results. It's hard to imagine that street noise, or even general office noise won't make voice interaction difficult, or impossible.

L&H says its directional microphone eliminates virtually all background noise. But whether or not this is too good to be true will only be confirmed when Nak models are released by licensees of the design.

SCOTT MONTGOMERY

TEETHING TROUBLE

The new fast link is great – but don't bet the farm on it yet, warns Gordon Laing.

My ADSL hell – a cautionary tale

Demon Internet has been running a trial of its forthcoming IPStream S2000 ADSL service since March, and claims it's well on its way to connecting 500 selected triallists. I was one of the 'lucky' 500, but only received the call that BT was ready to plumb in the hardware during the last week of May.

On the Thursday I was informed that my line was fine and I should expect the engineers to come over the following Tuesday morning. Sadly, on Saturday afternoon, my phone line went dead. I'd heard of some ADSL triallists temporarily losing their landlines and so assumed it was related. Unfortunately, for landline problems I had to go through the standard residential BT complaints line at the weekend, which duly logged the call, but wouldn't elaborate beyond the fact that an engineer was on the job.

As Saturday turned into Sunday, then Monday, I really began to realise how much I depended on my phone line. Not just for voice calls, but all data services too, as I work from home. Losing my landline meant losing my ability to electronically receive or deliver work, resulting in several unscheduled trips into town with floppy disks.

Tuesday morning arrived with my ADSL engineers, who were unaware of my landline problems. Fortunately, mid-installation of no fewer than three ADSL boxes, another BT engineer got my landline working again. ADSL was another story: hours of tweaking and head scratching later, we called it a day.

Wednesday morning, still no ADSL, with BT claiming it was a problem with Alcatel's software or cards at the exchange. As if in sympathy, my landline again gave up the ghost, but popped back on again later that afternoon.

On a clear night you can see Mars ... ADSL may have its teething problems, but try browsing hi-res images such as this one, of the Mars' polar ice cap, on an old steam dial-up modem. It is one of 25,000 taken by the Mars Global Suveyor that have just been posted at the Malin Space Science Systems site at www.msss.com

By Sunday, I still had no ADSL, nor any explanation of what had gone wrong. However, as a reassuring sign that someone was trying different settings out at the exchange, my phone line again went dead. As luck would have it, this weekend was a bank holiday, with the old BT residential complaints line advising that delays may be experienced.

It took until the following Tuesday for an engineer to come round and check out the problem and by this time, I was desperately cashing in any PR favours. My line was tested and verified up to the exchange, but there was still no dial tone or ADSL.

That evening, still with a dead landline, I noticed a set of lights flicker into life on my ADSL router. I fired up my web browser and bingo, it was working. Not only that, but it was quick. After several hundred emails, a Los Angeles radio station and much downloading, I noticed it was well past my bedtime.

Wednesday morning and in exquisite irony, my ADSL connection died mere seconds before a BT engineer triumphantly called to tell me he'd fixed my landline. Half an hour later, the lights flickered into life again, and for the first time in 10 days, both my landline and ADSL were working simultaneously.

Now one week later, both landline and ADSL are still working well. In fact, they're working beautifully. I'm not surprised to discover that ADSL has changed the way I work and I could not return to a conventional dial-up account. Rather worryingly though, at the time of writing, no-one at BT or Demon could explain why I experienced these problems. I understood my trial ADSL service could be variable, but you'd hope most of the bugs would be ironed out by now. With ADSL about to go live mere weeks after my line went inexplicably dead for the best part of 10 days, I'm not convinced it's ready. Hopefully, my experiences will have provided good technical feedback.

BT conducts tests on lines before installation, but clearly its survey didn't reveal my problems. BT also claims its ADSL 'support and service will be managed all day, every day, by a state-of-the-art Operational Support System'. I hope they'll handle dead landlines, too, as pre-launch I had to go through the BT residential complaints procedure where results took three days and few people had heard of ADSL – 'no, you mean ISDN' – I was told on several occasions.

The moral of this story? When it works, ADSL is wonderful, but then there's not much traffic yet to slow the service down. And there's the issue of dead phone lines. No-one seems to have any idea why my problems occurred, but I'd advise anyone who relies on their phone line to fit a spare, or give ADSL a few months to settle down first. I've certainly got mixed feelings about ADSL: I adore the service but I don't appreciate 10 days of being incommunicado.

Cable on a delayed roll

NTL has extended its £40-a-month cable modem service from Hants, Nottingham, Teesside, Cambridge and South Wales into Glasgow, Belfast, Herts and Beds. Access speeds are a nominal 512Kbits/sec downstream and 128Kbits/sec upstream. Initial user reaction is positive, judging from newsgroup discussions, although, like ADSL, the service has yet to approach congestion levels. NTL denies people have complained about delays in the rollout which was announced more than a year ago. But at least one PCW reader has had a letter apologising for the delay.

PHOTOGRAPH NASA/JPL/MSSS

FUTURE

BT Internet's Robert Salvoni tells Clive Akass about prices and strategy.

The unlit path to home hubs

Trailing across Britain are bundles of 'unlit' fibre – bandwidth by the terabyte, waiting for the broadband goldrush. How much and how quickly it gets used will depend on price as much as technology - and prices of ADSL, BT's broadband offering, are not low.

Dialup users, puttering along at 50Kbits/sec maximum, could be forgiven for feeling like motorists forced to pack the byways because they can't afford motorway tolls. So are we crawling in order to boost telco profits?

Robert Salvoni, head of broadband strategy for BT's Internet and ebusiness divisions, says BT Internet will lose on its £39.99-a-month home ADSL service. But this is not calculated on the cost of provision: BT Internet is an independent service provider, buying capacity from BT at prices agreed with the regulator Oftel.

Prices will come down, promises Salvoni, though he will not go as far as former BT interactive-services chief John Swingewood, who predicted a couple of years back that ADSL will be free, its costs covered completely by transaction and advertising fees. Salvoni says you pay one way or another and that a 'free' service, loaded down with adverts, is not necessarily the best option.

Robert Salvoni has a job worth smiling about

A common misconception is that ADSL bandwidth is guaranteed. In fact, this is true only to the local exchange, which still gives ADSL an edge over rival cable modems that have to share capacity with others. (Though cable, with its multiple channels, has a lot more headroom: on present reckoning, ADSL variants could push data rates to a maximum of 'only' 8Mbits/sec. Yet, according to predictions made within BT itself, home links could be up to 10 times faster than that in a few years.)

Beyond the exchange ADSL has a contention ratio of 50 users to one channel on business lines and 80 to one on home lines. Salvoni, in his Thameside office, points to charts showing how these figures maintain data rates on 'typical' line use, which is highly efficient thanks to the data packetisation.

He agrees readily that traffic patterns are likely to change drastically as people find new ways to use the links. This is where all that unused fibre comes in. 'We will monitor usage very carefully and switch in more capacity as and when it is needed.'

The shake-up of BT into business units does seem to have shaken the old lady out of her torpor. Salvoni and his colleagues throw ideas around like Silicon Valley entrepreneurs – complete with the jargon.

'We are very committed to multiple access,' he told us, meaning that BT Internet would be accessible by TV, WAP (wireless application protocol) phones, dialup, webpads – even cable, where appropriate. There will be deals bundling fast mobile and fixed broadband access.

The company is also exploring the possibilities of exploiting satellites in conjunction with ADSL and other fixed links, relieving line congestion by skycasting some data. This in turn could lead to 'home hubs', taking data from multiple sources and distributing it to a variety of devices.

Salvoni knows he is at the forefront of momentous changes and he clearly relishes the fact. 'This is the best job in the world,' he said. 'I would not swap it for any other.'

As the mcommerce buzz heats up, Tim Bajarin shows the way to Silicon Valley's inner sanctum.

Upwardly mobile markets

Developers and vendors are drooling over the possibilities of buying and selling via mobile devices as mcommerce becomes the latest buzzword to hit Silicon Valley. WAP phones and wireless-enabled handhelds are relatively new in the US putting it some way behind Japan where DoCoMo has sold six million Internet-enabled I-Mode phones.

Microsoft and AOL are both optimising versions of their online services for mobiles. But leading the charge is Palm Computing, whose Palm VII handheld has been on sale for a year complete with a dedicated wireless service. Adoption, outside specialist markets, was slow at first because few were willing to pay around £31 a month for 50KB of mainstream information. But it has really taken off now Palm is charging approx £28 per month a user can get unlimited data.

Palm says stock quotes and news remain the main attractions but stock buying, through Fidelity, is on the rise; so is booking flights through Travelocity. I have sat in an airport and with one stroke of a stylus on my Palm VII caused books to be sent to my home from Amazon.com's headquarters thousands of miles away. I still marvel at its apparent magic even though I understand how it is done.

Mobile accessories are another big emerging market. This £39.95 PDA survival kit includes screen overlays, cleaning kit and styli that fit onto pens. Available from Fellowes 01302 885331

Vendors predict mobile transactions worth billions of dollars worldwide and they want a piece of the action. But the profit is not necessarily in the devices themselves but rather the services they deliver. Competition for users willing to pay monthly subscriptions or per-minute usage will be stiff.

So service providers will be forced to subsidise some customers in order to get to the Holy Grail of an mcommerce customer base. In this model companies like AOL and Microsoft will get subscription fees as well as a percentage of every transaction made over their mobile services.

Palm has the current lead among handheld users with its dedicated Palm VII service but a new company called Omnisky has launched a competing service that should give it a run for its money. This competition should drive down subscription prices.

In the WAP phone arena, Nokia, Ericsson and Motorola are teaming up with the likes of Nextel, Bell South and many other local cellphone carriers to create services and commerce links.

Research in Motion (RIM) has just introduced a larger version of its popular Blackberry two-way paging device that packs wireless Internet link. Services will be limited to messaging and email at first, but a browser providing access to web information and mcommerce is coming soon.

Similar facilities will be available this year for new pagers and services from Motorola and Bell South. And this is just the beginning. I expect many more vendors and service providers to get creative with the possibilities of mobile devices.

Further adventures in venture capital

I have received a number of letters and emails over the past 12 months asking me to share some of the inner workings of Silicon Valley, particularly on issues of how venture capitalists (VCs) decide what companies to back and how deals are put together.

As you perhaps know VCs have put billions of dollars into Internet start-ups over the past three years. They are much more cautious these days, given the market downturn, but the basic principles of what they look for in a company are still sound.

Although I have spent many hours dealing with VCs and start-ups and understand how the deals get done I could not do justice to the topic in this space even if I wrote about it for months on end.

But Randall E Stross' *eBoys: The First Inside Account of Venture Capitalists At Work* gives a marvellous account of how the world of venture capital works, particularly in the wake of the current Internet boom. It covers the true story of the men who backed eBay, WebVan and other billion-dollar start-ups.

Stross was given unlimited access to the guys who run Benchmark Capital and has written the first inside account of VCs at work. This is a great read for anybody who is even remotely interested in how Silicon Valley money works and high-stake deals are put together. If you are thinking of courting venture capitalists to start a business of any type, this is a must read and one that gives a very concise understanding about the art of deal making, Silicon Valley style.

● *eBoys : The First Inside Account of Venture Capitalists At Work* (ISBN: 0812930959) $18.17 (approx £11.35) from Amazon.com

From Acorn grows one to watch

Element-14 has been picked as one of the 'Year 2000 Ten to Watch' companies by *Red Herring*, the bible of US hi-tech investors – just nine months after rising from the remnants of pioneer UK computing group Acorn.

The descendant of the company that manufactured the BBC Micro, on which many IT engineers cut their teeth, is targeting the emerging broadband market with designs for digital, analog and mixed signal processors, as well as software, tools and reference designs.

Backed by US venture funding, it already has 63 staff, including 56 engineers, in three centres in Europe.

Chief executive Stan Boland is bullish about its prospects: 'We're widely regarded as Europe's hottest silicon start-up,' he said in California, where he picked up the *Red Herring* award.

'Our first chips will make it possible for telecommunications equipment vendors to break the mould in standards-based DSL equipment, enabling the broadband internet explosion to be realised.'

Element-14 has onboard architects of the Acorn Group's original RISC chip, and intellectual property and tools they helped create.

Boland has quite a pedigree of his own. He took over as Acorn's CEO two years ago after helping to spin off chip developer ARM, whose success he intends to emulate. He is pinning his hopes on the explosion of the digital-signal-processor (DSP) market which is expected to grow to 1.3 billion by 2002.

Despite competition from the likes of Texas Instruments, Boland believes he is onto a winner, making chips that will maximise the line density on telco networks. RISC technology 'will allow machines to run at lower voltage and support more channels on a single chip than those of competitors,' he claimed. 'It will be the world's most powerful processor for this application.'

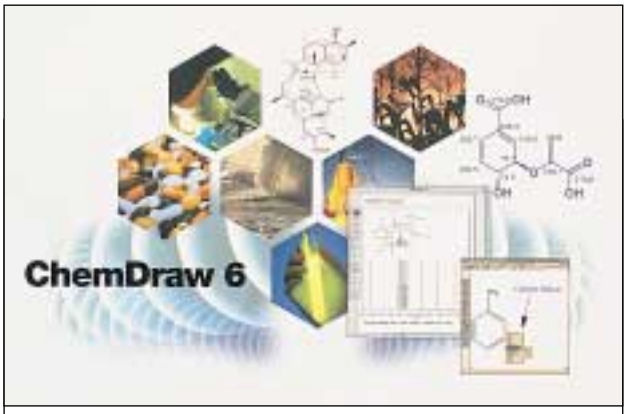
Element-14 is setting up a DSL engineering design facility in Belgium and scooped up the leading design team 'who designed the last five generations of Alcatel's DSL chips'.

The company's 21-strong silicon design team – built around a former ST Microelectronics team – is based in Bristol. In the next few months Boland plans to open a US office. Last July in the first round of funding the company raised £8.1m from US tier-one companies; a second round is expected to bring in another £6.25m to finance continued product development and the initial design stage of the company.

First working models are four months away with the Firepath processor, or Santorini digital IC, initially operating at 500MHz; first products will be sampled late in the fourth quarter.

Boland views the future's high-speed Internet usage as an unbounded opportunity for Element-14. 'We are right at the genesis of delivering bandwidth into people's homes,' he said.

www.e-14.com



Element-14 is, of course, named after silicon, which is number 14 in the periodic table. If you want to visualise that, or any other molecular structures, you can do so with ChemDraw from CambridgeSoft. The latest Ultra Version 6 includes features for handling stereoscopic chemistry. It costs £975 ex VAT and is available from Adept Scientific on 01463 480 000.
www.adeptstore.co.uk

Caroline Swift  ***reports from Silicon Fen***

Problems with the 820 chipset have prompted an interesting offer from Intel, says Gordon Laing.

See ya later, translator

If only everything in life was as reliable as a PC. Funny how you don't see that emblazoned on adverts, isn't it? Downloading patches, fixes, service packs and driver updates has become an everyday activity that we've grown used to. But there's nothing like something going wrong with hardware to set the spine tingling.

Regular followers of technology news must have heard about the problems Intel is facing with its 820 chipset. To be accurate, it's not actually the chipset that has the problems this time, but a pesky accompanying chip Intel had to produce in the face of customer demand.

The 820 chipset was never designed to use slow old SDRAM. It was to support shiny new RDRAM from Rambus. At the introduction of the 820 chipset towards the end of last year, RDRAM was expensive and in short supply – just like now. Many of Intel's customers expressed a preference for using more competitive and readily available SDRAM, so last November the chip giant came up with the Memory Translator Hub (MTH), which let an 820-based motherboard talk to DIMMs instead.

If you've got an Intel CC820 motherboard, you're ENTITLED TO A REFUND or a swap for an Intel VC820 with 128MB of genuine RDRAM

It seemed like the perfect solution, with Intel and Taiwanese manufacturers shifting an estimated one million motherboards equipped with 820/MTH. Well, it's a perfect solution apart from two points: first is that SDRAM memory performance under the 820/MTH is poor, and second, in mid-May Intel revealed that newly discovered problems with the MTH were sufficiently bad to start a programme of replacements or refunds.

Apparently, some PCs using the MTH intermittently reboot or hang when subjected to certain system noise. While I've never been a fan of the 820/MTH's SDRAM memory performance, I haven't experienced spontaneous system reboots on 820/MTH systems I've tested. Intel is keen to point out that the issue is not on all MTH-equipped systems, but is sufficiently concerned to start a recall programme it refers to as a 'replacement option'.

Intel recommends that you first identify whether you've got an MTH in your system – if it's an 820 chipset with SDRAM, then the answer is a big 'yes', although an 810KB download from Intel's website will also give you the bad news. Note that although the higher end 840 chipset was also designed for RDRAM, its SDRAM solution uses the different MRH-S chip, which while recently revealed not to like ECC memory, appears to be in the clear – for now. I've had one running almost non-stop for two months with no unwanted reboots so far.

Now while you can't prove your MTH is on the blink, Intel will apparently honour your request for some kind of action. If you've got an Intel CC820 motherboard, you're entitled to a refund or a swap for an Intel VC820 motherboard with 128MB of genuine RDRAM, although no-one's sure whether it's the nice PC800, not so nice PC700, or downright nasty PC600 variety. In fact, at the time of writing, no-one seemed entirely sure how this whole process would work. Who's going to physically replace your motherboard? Is there enough RDRAM to go round? What if you had more than 128MB of SDRAM and who gets your old DIMMs anyway?

Taiwanese motherboard manufacturer Asus seems to be the only company publicly stating its position on the MTH, but, as the largest supplier of boards using 820s with SDRAM, it has the most to lose. Asus seems to be happy with a refund-only policy, which is in line with standard warranties.

The 820 with SDRAM was always disappointing and this is a perfect opportunity to upgrade for free. Ask your system or motherboard supplier what they're offering. Try for the RDRAM replacement, but consider selling it, as in our SYSmark tests everyday performance is often matched by cheaper SDRAM on BX-based motherboards.

So buy one of these new BX boards instead, or swap your 820/MTH for one if your supplier isn't going for the RDRAM offer. Then again, Intel's new 815 'Solano' chipset designed for PC133 SDRAM should have arrived by the time you read this, but it isn't being offered as an official replacement to MTH customers.

Like many people, I'll wait for the 815 before committing – after all, new motherboards using the reliable BX chipset and SDRAM are arriving every day and beating everything I've tested. Intel is being honest about the MTH problem, but in terms of customer confidence, it may be a case of once bitten, twice shy.

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Even after being bitten by the Love Bug, we're still sending VBS emails around, warns Barry Fox.

Basic precautions

The UK Government spent tens of our millions scaring us about the Y2K bug with roadside hoardings. But it never did tell us what to do – even though it had the answer on a plate.

In August 1998, Robert Clark and Duncan Cooper of the Information Systems Division at University College London were looking for an easy way to check their 5,000 PCs for Y2K compliance, without putting date-sensitive data at risk by advancing the clock.

Clark and Cooper soon twigged that the different BIOS versions used in PCs are uniquely identified by release date. So they suggested that the DTI's Action 2000 team should cross-reference BIOS version dates with Y2K compliance and put the list on a free disc and Internet site, along with a simple BIOS date-check utility.

Action 2000 visited UCL in November 1998 and said it was interested. UCL heard nothing further, so in January 1999 chased Action 2000 which said it 'would have someone on the case soon'.

'We never did hear back,' said Clark, 'but we did receive a Christmas card and CD-ROM that recommended manually advancing the date.'

I was reminded of this when the 'I Love You' virus struck and infected government systems. If the money the DTI squandered on Y2K-scaring had been used to tell the public about the risk of opening binary attachments, a lot of people would have been spared the misery and file loss which the Love Bug and copycat VBS viruses are causing.

Most binary attachments are unnecessary. They waste space on pointless pictures, fancy formatting, macro routines, graphics and sound. Words in plain ASCII text are all that is necessary to convey most messages and there is no way (yet) that ASCII can infect. Radio stations such as LBC in London automatically refuse to accept incoming attachments. Internet, game and email systems that bolt on to a TV set and standalone emailers do not handle attachments either.

As the Love Bug proved, it is not safe to assume anti-virus software will trap an incoming infection. There are several dozen new viruses every week and even if you update your anti-virus software each day by downloading a new signature file, the software company needs a day or so to analyse the new virus and write a fix for it.

Even updated, my Panda software was still missing 'I Love You' because the default setting regarded Visual Basic Script files as safe and not worth scanning.

New viruses such as Melissa and the Love Bug spread by automatically emailing a copy to every address stored in Microsoft Outlook. Microsoft's website (http://officeupdate.microsoft.com/downloaddetails/Out98sec.htm) offers a Security Update that is free to download. It stops Outlook receiving risky attachments and automatically forwarding them to others.

Describing it as a 'significant security enhancement', Microsoft fends off legal claims by assuring that although 'this update limits certain functionality in Outlook to provide a higher level of security, it was not created to address a security vulnerability within Outlook'.

Avoiding Outlook is no protection against infection. AOL and Compuserve say they cannot block delivery of a known virus because it would amount to tampering with private mail. I was sent several copies via Compuserve. Soon after, I received a message from Compuserve's general manager David Fischer. Did it warn about the risk of opening attachments labelled 'I Love You'? No, it was a puff about the benefits of using Compuserve.

For over a year I have been politely begging IT companies and their PR people to email press information as plain ASCII text. Some have sneered and carried on sending binaries. Others have sulked and stopped sending anything. I am a lot less polite now.

AOL and Compuserve say they CAN'T BLOCK DELIVERY OF A KNOWN VIRUS because it would amount to tampering with private mail

Since the Love Bug proved that binaries really are a no-no, I've received safe text press releases from Compaq, Alta Vista, Novell, Tivoli Systems, Texas Instruments, Electronic Arts, Motorola and BT. Of course, some things never change. Despite the Love Bug, BT Cellnet is still cheerfully sending out Word binaries. And Microsoft's PR agency sent out a few words of text – dressed up as a fancy binary graphics file.

Others have gone overboard on safety. A trade magazine has installed an email filter that rejects any text message that contains the words I Love You.

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Brian Clegg asks whether the digital camera is step forwards or just a gadget for the boys?

Digital dilemma

I love gadgets as much as the next man, but it's also far too easy to completely lose your rationality when faced with a shiny box and lots of exciting buttons. Actually, when I say 'as much as the next man' I am being literal not sexist. I don't have any scientific evidence to back up my theory, but anecdotal evidence suggests that techno-toys appeal more to men than they do to women. Does the very thought of a global positioning device get your adrenaline flowing? How about the newest WAP phone or MP3 player? If the answer is yes, the chances are, you're male.

Whether this obsession is simply down to never growing up or something more mysterious, gadgets have a fatal attraction, and today's gadget keyword is 'digital'. In George Orwell's book *Animal Farm* the sheep chant 'four legs good, two legs bad', getting all worked up about a slogan. Fifty years on the chant is likely to be 'digital good, analog bad'. Digital TV, digital phones, digital video, digital MiniDisc, digital cameras – we've gone digital crazy.

Fifty years on the chant is likely to be 'DIGITAL GOOD, ANALOG BAD' – digital TV, digital phones, digital video – we've gone digital crazy

In the past, the gadget urge has taken us to ridiculous extremes. Take, for example, the digital watch (yes, I know that's a different kind of digital), which was mocked mercilessly in the classic radio series/book/TV series/towel *The Hitchhiker's Guide to the Galaxy*. For normal use an analog dial is so much more effective – it's quicker to read, easier to estimate differences – it even looks better. If you take a wander down your local high street and glance inside any jewellery shop, you will find that the digital watch has definitely had its day. We've got onto the 'four legs good, two legs better' stage. I can't help wondering if the same thing could happen to digital cameras.

I bought a digital camera about six months ago. For the business it's superb. No wasted film, easy incorporation of images into electronic documents, no need to scan an image to send it down the line, and total control. If, for instance, you're attending a conference and you want to incorporate pictures from the morning session into the presentation for the afternoon, it's no sweat with a digital camera. I'm equally ecstatic in gadget-loving mode. Which analog camera would allow me to transform a picture to sepia or beef up my optical zoom with digital muscle? I never run out of film (even if I occasionally forget to recharge the batteries), and I can cram in an incredible number of low-resolution shots if I need quantity rather than quantity.

However, let's take off those rose-tinted specs just for a moment. For domestic, rather than business use, the advantages of digital cameras are less clear cut. I might not have to pay for film but, like many camera owners, I probably only used three rolls a year, which hardly breaks the bank. With the digital camera I take three pictures where I would have taken one before, increasing the chances of a good result, but the quality of image isn't as good as it was on film.

And then there's processing. I don't have to take my film into the local photo processing outlet to be printed any more, but keeping the images on the PC somewhat misses the point. I want to be able to bore my friends and colleagues by showing them my pictures, rather than dragging people into my office to check out my photo library on the PC. Of course, I can make prints on an inkjet printer, but this isn't ideal. It brings the cost back up, and it's time-intensive, especially with the temptation to reframe each picture before it's printed. The other problem is fade – like it or not, those inkjet photos won't be the same in a year's time. In some ways, the step to digital has been a backward one.

The digital camera is such a versatile gadget that it will overcome the negatives (excuse the pun). It's only a matter of time before your friendly local photo shop will be able to handle a memory card as easily as a traditional roll of film, giving you lasting prints to pass round your friends and relations. Add to this the fact that Sony already has a digital photo frame for displaying your pictures direct from memory card, and it's only a matter of time before the photo album is a thing of the past. As good as the real thing, more flexible, and it's digital too. Or am I just giving way to that primeval urge? Analog bad, digital good, analog bad, digital good...

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The Love Bug fiasco demonstrated that the PC was never designed for the masses, says David Fearon.

The nerd's revenge

I've got to admit to initially feeling completely snobbish about the whole Love Bug virus affair. On the morning of the day in question, I checked my email and noticed that, among the messages, was one from a company PR rep, with that now infamous subject heading.

'Hang about,' thinks I, 'why is a woman I've never met telling me she loves me?' So I drag the message attachment into Notepad. It's clearly a very nasty piece of Visual Basic Script, so I promptly delete it and think no more of it. Until six hours later when I come home and switch on the telly. 'Computer virus causes worldwide chaos,' announces Ceefax. Margaret Beckett is quoted as telling a semi-paralysed House that there's 'no known cure'.

My first reaction is one of complete incredulity. How can people be so stupid as to double-click on such a dodgy-looking attachment? Are they really that clueless about the effect it could have on their systems? Well, yes, but it's hardly their fault.

Our esteemed editor, Mr Emeran, has often been heard to say that PCs will never be consumer-friendly appliances, despite efforts such as the EasyPC initiative and Windows Millennium: they're simply too arcane. And after the Love Bug affair, I'm sorely tempted to add a footnote stating that the Internet will never be consumer-friendly just as long as PCs exist.

To bring myself back into the real world of people who don't spend their lives reading about TCP/IP, I sometimes like to sit down in front of a Macintosh. This is always a sobering thing for me to do, the reason being that I've never had any cause to use an Apple computer in anger and consequently haven't a clue how to work one. I'm hopeless: can't even start up a web browser. After a few minutes' aimless fiddling with the mouse, wondering how to right-click, I slink back to my PC with a fresh sense of appreciation about the way most people view computer technology.

The more I think about the Internet revolution the more absurd it seems to me. Two generations of nerds grow up treating computing as a hobby, while the rest of the world edges quietly away from the anoraks with the body odour. But suddenly it all actually matters.

Sitting on the tube this morning, nearly every advert along the top of my carriage had a URL placed more prominently than a phone number. The thing is, most people can use a phone – considerably less than 20 per cent of the population can tell you what 'URL' stands for or what to do with one.

I did a short email interview with author and noted technology evangelist Douglas Adams a couple of years back and he drew a parallel with chairs. Chairs, he pointed out, were considered high technology once. But now we don't notice them, the implication being that computers will eventually mature and melt into the background in the same way. Chairs, however, were invented with a single purpose: to sit on. Food mixers were invented to mix food. Cars were invented to get us from A to B. And hey, they work.

However, the origins of modern desktop computers were way back in the late 1970s, when they didn't matter all that much and there was no clear reason for their existence. They were designed by nerds for the sole purpose of giving themselves something to tinker about with. And the reason that they are so complex is because that is precisely the way nerds like them. They were never supposed to actually work: where's the fun in that?

Considerably less than 20 PER CENT OF THE POPULATION can tell you what 'URL' stands for or what to do with one

But now, here we all are, largely as a result of the Internet boom, attempting to get to grips with twisted, evil and generally awful bits of machinery, bravely acting as if they were designed for the express purpose of empowering society from the word go. It's the strangest thing in the history of the world. When was the last time a minority hobby became capable of bringing down the House of Commons? If people started telling us we had to have tapestry frames on our desks or build matchstick replicas of famous Napoleonic galleons, we'd tell them where to go.

So my message is simple: if the Internet is to merge with society, we need to abandon the conventional computer: nerds and normal people don't mix.

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letters

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CAUGHT NAPPING

The other night, while thinking about which songs I could be grabbing with Napster, I found myself flicking through the cable channels. I happened across a story on CNN that Napster was being taken to court in the US; in a lawsuit seemingly led by Lars Ulrich of Metallica. Poor Lars was very upset that someone had leaked unfinished Metallica tracks and encoded them into MP3s, leaving them for download by Napster users.

It struck me that this was a bit of a retaliatory, knee-jerk reaction. But now, I think I've seen the light. Lars and the entire music industry are aiming at the smallest target. Let's face it, the recording industry has had a problem with MP3s on the Internet since day one, but who is to blame for MP3s existing on the Internet? There are lots of people responsible: the ISPs, the computer manufacturers and the companies that programmed the MP3 encoders.

All of the above are untouchable, though, and Napster is just an easy target to get a beefy, precedent-setting test case under way. I mean, if we follow the logic of the record companies through, then the creators of all the various FTP, mail and news clients are totally responsible for the spread of illegal porn and wares on the Internet.

The recording industry needs to realise that nothing will stop the spread of MP3s on the Internet and if they do cut the head off this hydra, more will grow back in its place. As a musician myself, I can see where this is all going. The spread of MP3s on the Internet will eventually create a level playing field for all of us. Popularity and fame for musicians will come from writing and playing good, original music; their money will be made by performing. There won't be the money around to launch the careers of 'marketing-oriented' musicians any more, as the record companies will eventually fold under the power of the Internet. Let's be honest, grabbing the one song from a one-hit wonder off the Internet and playing it until you are sick of it is a much more attractive proposition than buying and having to endure the entire album! Is it only me who thinks the recording industry has had this coming for a long time?

One last question remains though:

LETTER OF THE MONTH

CONNECTOR MORSE

What an interesting review of the Amstrad CPC in the *Retro* column of your July issue. My dad bought one when they first came out and it served us well. Around 1992 when I was 14, I got hold of a second CPC464, cast off by a friend who had upgraded to an Amiga.

Being practical and having too much spare time, I decided the best thing to do would be to network the two machines. I couldn't afford serial adaptors and didn't understand the protocols involved, so I drew up my own networking protocol using as a basis, Audio Frequency Morse Code, would you believe, going from the headphone socket on machine A, through my Electronics Experimenter set, to the joystick port on machine B.

Programming machine A with Morse Code was easy, but then I had to decode it. I wrote a Basic program of about 400 lines that timed the pulse received on the joystick port and wrote either a '.' or a '-' to memory. The second stage referred the string of Morse to a directory, including all the Morse characters and about 50 of the more common words, to enable the computer to transcribe onto the screen as it received. Damn me if it didn't work too, after much tweaking of software, adjusting the electronic connection and choosing a frequency that transmitted well across the room!

After about four weeks I had a working one-way link. Unfortunately, I couldn't use it, as my comms program used about 90 per cent of the 64KB memory. After some experimentation I also succeeded in wireless networking, using a pair of walkie-talkies. But the error rate was pretty high and the range was limited to about 10 metres by the need to suppress noise. I think Bluetooth is a more realistic way of doing this.

I thought at one time I might have a future in PCs, but I was left behind – as were my CPCs – by the rush of expensive new technology. However, here I am, with a new Celeron 500 PC on my desk, a basic web page already set up, and most of my curiosity still intact. Who knows where this may lead...?

CHRIS EMERY

how did unfinished Metallica tracks find their way from the studio onto Napster?

JASON MARK CURLEY

NIALL MAGENNIS replies ›

I wouldn't agree that ISPs, computer manufacturers and companies that programmed the MP3 encoders are responsible for the distribution of illegal MP3s. It is those people who encode copyright material as MP3 files and then upload them to FTP servers, web pages and Napster who are solely responsible. You can't blame car manufacturers, road builders and petrol companies for the fact that a tiny minority of people choose to use cars for ram raiding, can you? However, you are probably right that record companies as we know them have had their day.

Nevertheless, I don't think the future is going to be a Utopia for struggling musicians. It's likely that, when they come to their senses, the major record companies will set up their own services similar to Napster, except that they will charge a subscription fee. Napster is not just popular because it's based on piracy, but also because it allows you to download the songs you want, when you want, and from wherever you want.

HAPPY CLOCKERS

Like many PC users, I had sadly come to the stage where my PC was beginning to show its age. Having read several articles on upgrading and being reluctant to spend much money, I decided to delve into the world of overclocking. I used to have a K6-III 400, which was good but not powerful enough for the games I was playing (such as Quake III), but after the wonders of overclocking, I managed to boost my CPU's performance by 25 per cent, pushing it up to K6-III 500 standards.

Having been surprised at how easy and effective this process was, I decided to try overclocking my Voodoo 3 2000 by increasing the core clock speed from 143MHz to 190MHz, way past the standards of even the Voodoo 3 3000. Any gamers would greatly appreciate this increase as it resulted in a 20fps boost in Quake III and Unreal Tournament.

To combat the problem of overheating, I added a small £11 graphics chip fan. Even so, I still made a saving of at least £20 by not buying a Voodoo 3 3000. Having prolonged the life of my PC for the next few months, I felt obliged to inform all other short-of-money PC users about the wonders of overclocking.

Although there is a large risk with overclocking, provided you spend generously on cooling there should be no problem. In the next few months, I am looking forward to buying a 650MHz Athlon and overclocking it to 1GHz. Considering that a 1GHz Athlon costs around £900 and a 650MHz Athlon costs around £140, along with £60 for heatsinks, fans and thermal transfer paste, I will be saving up to £700 – enough money for a new PC if necessary.

ALISTAIR MACKENZIE

NIK RAWLINSON replies ›

Overclocking is perhaps the cheapest way to speed up your machine, but it's not for the faint-hearted. You should also bear in mind that there is a good chance you are invalidating any warranties on either the component with which you are tinkering or even your whole system. That said, with the graphics market moving so fast we'd always welcome a way to prolong the life of our cards. But as games developers embrace new features such as hardware bump mapping, one day the inevitable will happen and all the overclocking in the world won't be able to save your beloved chipset from being added to that pile of components that will one day go to make a 'secondary' machine.

YOU'RE UNSUBSCRIBABLE

Following June's *News* article *Unmetered and indecipherable* I wanted to highlight another problem: 'Unmetered, indecipherable and unsubscribable'. I have been a member of Lineone.net for over a year now and have introduced various friends to the service. Back in February I started to receive promotional emails about its new unmetered service through Quip. I pre-registered and waited in keen anticipation; and lo and behold on 2 April I got my invitation to join.

I quickly logged onto the site, read the conditions and decided to sign up. I completed the registration forms correctly and fully, and it was then that my problems started.

My application was rejected. I tried again using my debit card instead of my Gold credit card and then again with my Egg card, each with the same result. No reason was given. A little upset I emailed

Overclocking may give you a free upgrade, but at the expense of your hardware warranties!

Didn't you get our email? Staying online in France can be a little tricky

PHOTOGRAPH GETTYONE STONE

both Lineone and Quip. But there was no reply.

A couple of days later I tried again. Again I was rejected. Getting more upset I emailed Lineone and Quip again. This time Lineone invited me to re-apply. No explanation for my rejection was given and only a cursory apology.

I have since tried to register six times using a combination of credit and debit cards (all of which are well within their credit limits), all without success. I have sent over a dozen increasingly irate emails to both Lineone and Quip. No reply from either. Quip also has a service which says it will tell you if your registration has been successful. I emailed it twice. Still no reply!

Once again it seems that BT and the computer industry have sunk to new lows in customer service and satisfaction. Still, it's a novel way to ensure your service isn't over-subscribed – don't let anyone join!

TIM MARCHANT

CLIVE AKASS replies ›

Considering the magnitude of the changes hitting service providers at the moment, I'd be very surprised if there were no hiccups. The problem is that there is no foolproof way of predicting demand, either for subscriptions or line time, because both the patterns of use and the demographics of users are changing. It will be weeks, even months, before we will get a clear picture of how unmetered access is working out.

THE PRICE OF ADSL

I was interested in Clive Akass' piece (July *PCW*) on sharing BT's ADSL connections. It seems to me that BT has become rather confused about precisely what it is selling, ie bandwidth. Both the single-user and the multi-user lines appear to offer a 512Kbits/sec connection with the significant difference between them being the equipment installed in the customer's premises.

The single-user service is terminated on an ADSL modem with a USB connection, while the multi-user service comes with an ADSL modem and a router. Using a USB connection for the single-user service strikes me as a sneaky way of discouraging sharing.

I have a network of five or six systems at home and as far as I can see the only way I could do sharing over a single-user connection would be to use software such as Microsoft's Internet Connection Sharing or WinGate. I am loath to put a Windows system in the role of gatekeeper between my data and the outside world. I would much rather use a Linux box, but the use of USB effectively rules this out for the foreseeable future.

My preferred solution would be to use a dedicated router, which I can get hold of for around £200, but this doesn't seem to be an option. The only way I can get a 10BaseT termination is with the multi-user service and, in that case, BT insists on providing me with a router.

The net effect is that I have to pay a 150 per cent premium of an additional £60 a month to connect myself to BT's ADSL. Since I live in an area served by NTL's cable system, I am much more inclined to go there for a cable modem, to which I can connect my own router at a cost of £40 a month.

In my opinion BT should separate out the service and equipment provision parts of its ADSL service, providing consumers with a choice of connection method and including the additional cost of providing a router (if required by the user) in either the installation fee or an increased monthly service charge.

MARTIN KIRK

CLIVE AKASS replies ›

BT seems ambivalent on the issue of sharing. Commercial USB-sharing options will certainly become available. Incidentally, you will get a slighty better quality of service on the business ADSL links, as these have a contention ratio (the number of users per link) of 20 to one as opposed to 50 to one on the USB link. BT tells me this is better than in the US, where the ratio is usually between 60 and 80 to one. A more interesting comparison will be with cable, where you will share the bandwidth with all other users on your local loop.

On your last point: BT is due to unbundle the local loop soon, which should open up the market, as you wish.

YOU'VE (NOT) GOT MAIL

Reading Paul Fisher's account of his trials and tribulations with France Telecom in your July issue, I felt I had to share the experience of my cousin and her husband, who live in France.

Last summer I helped them set up their Internet connection on a dedicated line. I have a passing knowledge of PCs but no French, whereas her husband was a PC novice, but was able to speak French. After many lengthy, sometimes frustrating and often amusing three-way telephone conversations, we managed to get the system up and running.

They returned briefly to Britain this year and before doing so accepted an offer from France Telecom to move onto a cheaper tariff for their Internet connection. On their return they were unable to get any response from the Internet. After some time they managed to get hold of someone at France Telecom with the answer. They were told that, when they moved to the new tariff, the telephone number they had to dial to get a connection had been changed. My cousin contacted them to say that it would have been nice if they had let them know about this. The answer came back: 'We did. We sent you an email!' '*Zut alors!*,' as Paul said.

CHRISTOPHER JOHN

CLARIFICATION

In the introduction to last month's *Reviews* section, we made reference to a fictitious character called Colvin. We would like to make it clear that this character in no way related to Colvin Eccleston or anyone else called Colvin.

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Nik Rawlinson
DEPUTY EDITOR

We must keep lifeline open

It's the beginning of June as I write this and the trial of David Copeland, the man accused of planting three bombs in Brixton, Brick Lane and Soho, has just begun. By the time this column appears in print the trial is expected to be over and the outcome will be known. In the meantime, the London papers are, perhaps not surprisingly, devoting considerable acreage to the case and to reporting that the accused allegedly downloaded two books from the Internet: *The Terrorist's Handbook* and *How to Make Bombs Book 2*, before planting bombs in areas frequented by minority ethnic groups and gay drinkers.

It is perhaps this fact that for many is the most shocking – it is as though a trusted third party has turned traitor. The Internet is a means of support for many in minority groups and it is precisely those groups that were targeted using information gathered from that same resource.

It is this fact that is the most shocking – as though a trusted third party has turned traitor

During the six years I have been online, I have seen plenty of changes. What was once a largely text-based medium has fully embraced photography and multimedia. Modem speeds have increased four-fold and we have come to accept the abolition of account membership fees and free access for all. It is perhaps this last change that has been the most important, lowering the barriers to entry so it is no longer merely a network of the privileged few or those in further education.

But one thing that has remained constant throughout that time is the sense of belonging that it fosters, drawing individual users into multinational communities defined by interest, ability or personality. Growing up gay is not an easy thing to do – throughout your education you are justifiably taught the value of the family unit while those around you, who know no better, assume that you are something you are not. More often than not, those who find themselves in this position feel a need to conform to society's expectations and hide their true self behind a façade of heterosexuality, ending up feeling lonely and worrying what will happen when the truth must finally come out.

For many, therefore, the Internet provides their first contact with other gay people and helps them to realise that they are one of countless millions around the world. Newsgroups, websites and even dedicated keyword areas in some of the content-driven online services, such as AOL's Utopia, allow them to talk about their feelings and concerns anonymously and safely before having to admit to either themselves or the world that they are gay.

Ethnic communities also use the Internet to great effect. Many members have relatives overseas and for them the Internet is an effective means of keeping in touch with loved ones without the cost of long-distance phone calls, allowing them to send photos of events that could not be attended in person. It is also a cheap way of organising activities and publishing community news and noticeboards.

For minority groups everywhere the Internet has become so much more than a way of researching your hobby, checking train times or booking tickets for the cinema. It is a lifeline to a life they have left behind or, in some cases, they have not yet found and as such it is a trusted mentor, a dependable messenger and a faithful friend. It seems a cruel twist of fate, then, that those who were the targets of bombs are also likely to be those who would argue the loudest for the freedom of the Internet.

VNU European Labs

VNU Labs tests all kinds of hardware and software, from PCs and modems to databases. All our tests simulate real-world use and for the most part are based on industry-standard applications such as Word, Excel, PageMaker and Paradox. Our current PC tests for Windows 98, NT and 2000 are the SYSmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

ratings

★★★★★	**EXCELLENT**
★★★★	**VERY GOOD**
★★★	**AVERAGE**
★★	**BELOW AVERAGE**
★	**POOR**

Mesh Matrix 850T

The new-improved Athlon with on-die cache is the jewel in the crown of this high-end system.

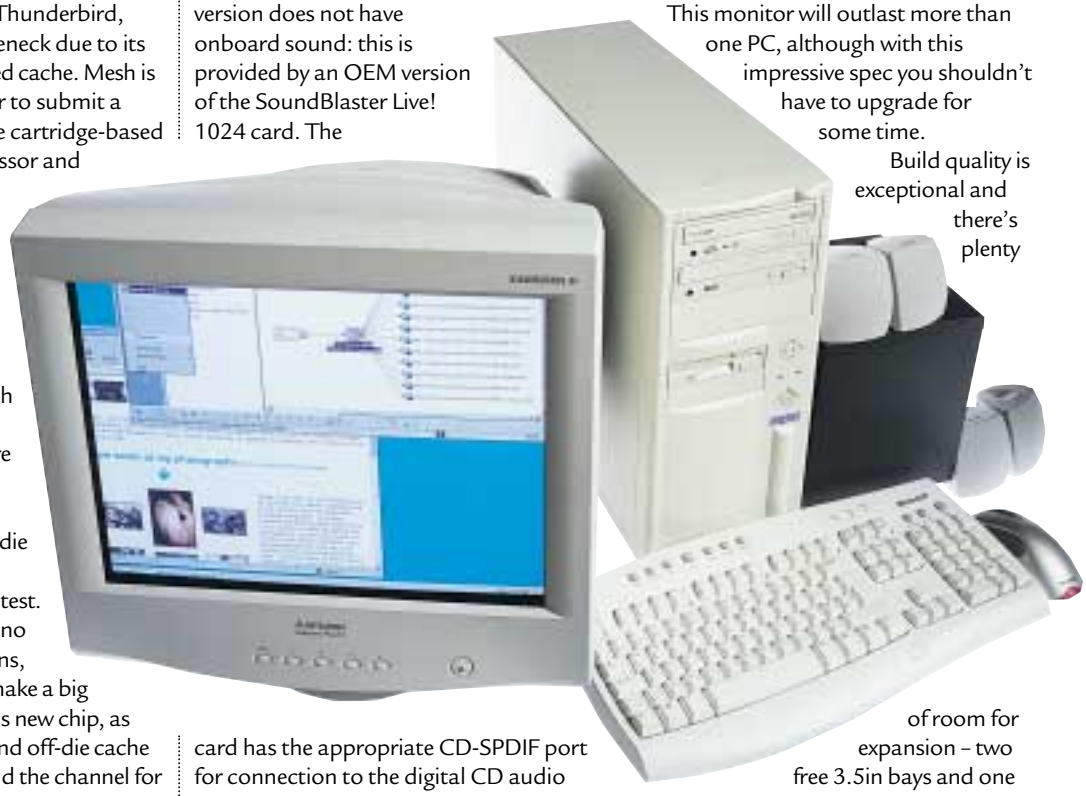
AMD's Athlon is an impressive processor, but recently it has been hampered by a speed bottleneck. The 512KB of off-die cache meant that it frequently lost out to Intel in our performance tests. The latest revision of the Athlon, codenamed Thunderbird, should remove this bottleneck due to its 256KB of on-die, full-speed cache. Mesh is the first PC manufacturer to submit a machine built around the cartridge-based version of this new processor and it has put together an excellent package that shows off the technology while keeping an eye on value for money.

The processor is clocked at 850MHz, which helps the PC achieve a respectable SYSmark score of 164. This is quite an improvement – the last 850MHz Athlon with off-die cache that we reviewed achieved 152 in the same test. The processor itself looks no different to existing Athlons, and AMD isn't going to make a big song and dance about this new chip, as there will be a mix of on and off-die cache processors floating around the channel for some time.

Taking a closer look at the sides of the processor cartridge, however, revealed that the cache chips seen on the previous generation of Athlon processors were missing, as they should be.

This machine isn't just about the latest processor, though. The components Mesh has put inside make this a well-rounded system. The choice of graphics card is the excellent new Hercules 3D Prophet II (see review p114), which uses nVidia's latest chip, the GeForce 2. Hercules has placed large heatsinks on the 32MB of DDR memory, which we reckon will leave more scope for overclocking. It also comes with both S-Video and DVI connectors, ensuring that you'll be able to connect it to all of today's latest multimedia devices.

The processor has been mounted on MSI's K7 Pro motherboard, which uses AMD's 750 chipset. After everything is taken into account, three PCI slots and one shared slot remain free for future expansion. AMD's chipset doesn't support PC133 memory or AGP 4x, but motherboards based on VIA solutions, such as the Atlas Meridian A750T reviewed on page 78, should result in a marginal performance increase. Memory consists of 128MB of PC100 sitting in a single memory slot, with two free. Mesh's version does not have onboard sound: this is provided by an OEM version of the SoundBlaster Live! 1024 card. The card has the appropriate CD-SPDIF port for connection to the digital CD audio port, although no cable is supplied.



A large 30.7GB Maxtor DiamondMax Plus 40 hard drive sits in a 3.5in bay, leaving two free. This is more than enough for all but the most data-hungry users. For backup, Mesh has gone down the CD-RW route, with Panasonic's CW 7585. This writes at eight-speed and rewrites at four-speed. There's an extra drive inside for on-the-fly copying – Pioneer's DVD-115 is present in the second 5.25in bay. Cyberlink's Power DVD is supplied to let you watch DVDs with no dropped frames. Mesh has opted for Adaptec Easy CD Creator 4 to operate the backup device and this works efficiently under the chosen operating system, Window 98.

The rest of the software is first rate considering the machine's price and specification. Microsoft's Works Suite 2000 is not as fully featured as Office 2000, but it is a complete office suite and comes with Word as a separate application. There's also a copy of Ringcentral to help you send faxes through the supplied Diamond Supraexpress 56i Pro modem.

The monitor is first class. The Mitsubishi Diamond Plus 91 is a good example of a 19in aperture-grille model. The Naturally Flat Diamondtron tube can comfortably run at higher resolutions and be looked at for long periods of time. This monitor will outlast more than one PC, although with this impressive spec you shouldn't have to upgrade for some time.

Build quality is exceptional and there's plenty of room for expansion – two free 3.5in bays and one 5.25in bay. Combine all this with the five-piece Labtec LCS 2514 speakers and you've got an attractive package with the latest technology at a bargain price.

JASON JENKINS

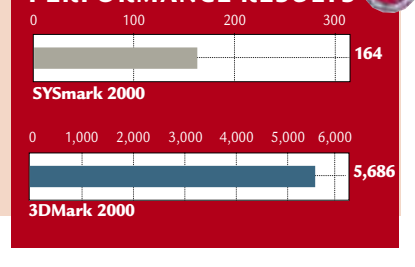
DETAILS

★★★★★

RECOMMENDED Personal COMPUTER WORLD

PRICE £1,761.33 (£1,499 ex VAT)
CONTACT Mesh 020 8208 4706
www.meshplc.co.uk
PROS Fast; great choice of components
CONS Some may still hanker after Microsoft Office 2000
OVERALL A fantastic machine that shows off AMD's new processor beautifully

PERFORMANCE RESULTS

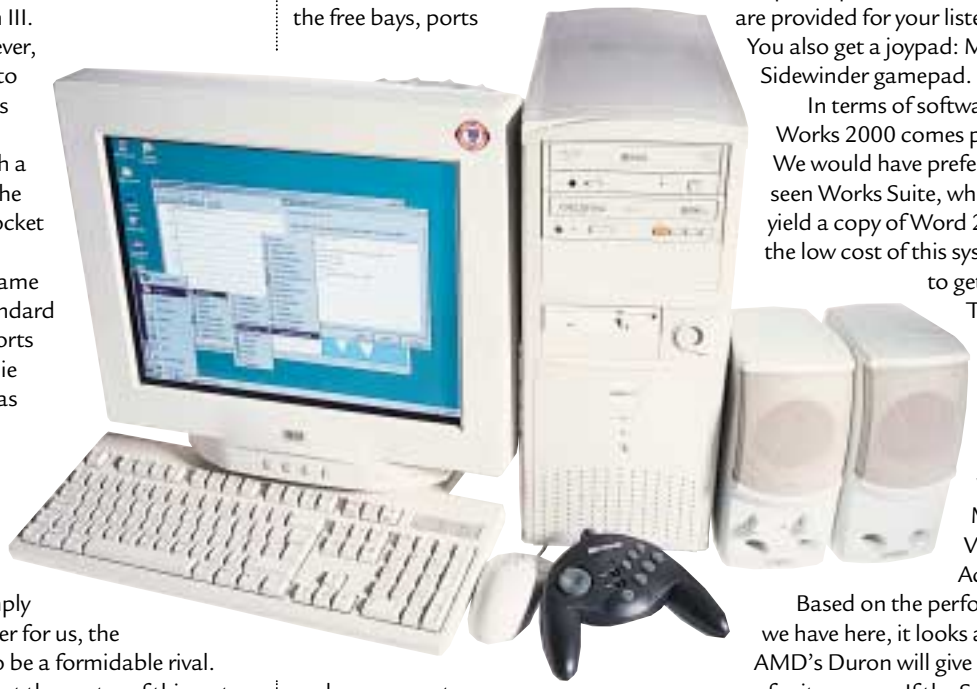


Systemax D650 RV Pro

AMD's Duron processor poses a challenge to Intel's Celeron on both price and performance.

Before the launch of the Athlon last year, AMD made its name producing value-oriented processors in the shape of the K6-2 and K6-III. In the past year, it has managed to shake off this image fairly successfully, positioning the Athlon as a direct rival to Intel's Pentium III.

Now, however, it has decided to complement its range of processors with a Celeron rival, the Duron. This Socket A processor is based on the same core as the standard Athlon and sports 128KB of on-die cache. AMD has promised to compete aggressively with Intel on price and, judging from the system Simply has put together for us, the Duron looks to be a formidable rival.



The Duron at the centre of this system is clocked at 650MHz and, in common with Intel's Celeron, has 128KB of on-die cache. This is half that of the new on-die cache Athlons (codenamed Thunderbird) and helps AMD save on production costs while still offering a speedy processor.

At the time of writing, the choice of motherboards was thin on the ground, as with any new processor launch. The one chosen for this system is Gigabyte's new GA-7ZM. Unfortunately, this is of the microATX variety – normally the fact that this is present in a full size ATX case would get us worked up, but given the dearth of boards, we'll let Simply off this time.

The GA-7ZM uses VIA's new KT133 chipset, which has a couple of important advantages over AMD's 750. First, it supports PC133 SDRAM for an extra performance boost. Second, the single AGP slot is AGP 4x compatible.

The motherboard itself has three memory slots, one of which is occupied by 128MB of PC133 SDRAM. There are two PCI slots available and a third one that is taken up by a generic winmodem. At the base of the board is an Audio Modem Riser (AMR) slot, which Simply has chosen to leave vacant.

Build quality is very impressive. Simply has positioned an enormous heatsink on the Duron and this, combined with its fan, should help ensure that you won't experience any overheating problems. In addition to this, all the free bays, ports and components are easily accessible.

In the AGP slot is a Creative Annihilator Pro. This uses the original GeForce chip, together with 32MB of DDR memory, to produce some pretty impressive 3D scores. The PC raced along in our Quake III timed demo, managing an impressive 71.6fps. 3DMark 2000 was also a good performer, managing to rack up 4,555. Considering the stated clock speed of the processor and the price of the system, these are a great set of results – you'll be able to use this PC for games as well as less demanding applications.

Simply's trademark makes a reappearance in this PC – the company has included both a Ricoh DVD/CD-RW combo drive and a Creative 52x CD-ROM. This means that you'll be able to play the latest DVDs, load DVD software and still copy discs on the fly. This would be good in any system, but it represents tremendous value in one costing only £899 ex VAT. A generous 30.7GB Maxtor hard drive is provided, which we would expect most people to have a difficult time filling.

There's been no compromise with the monitor, either. The CTX PR705F is an excellent example of a 17in aperture-grille model. It uses an FD Trinitron tube to display a picture that even first-time users will appreciate.

Sound is onboard, courtesy of VIA's KT133 chipset, and a pair of half-decent two-piece speakers – Creative's SBS52 – are provided for your listening pleasure. You also get a joypad: Microsoft's Sidewinder gamepad.

In terms of software, Microsoft's Works 2000 comes pre-installed. We would have preferred to have seen Works Suite, which would also yield a copy of Word 2000, but for the low cost of this system it's nothing to get excited about. The company is also offering a limited software bundle containing WordPerfect 8, McAfee VirusScan and Acid Music.

Based on the performance results we have here, it looks as though AMD's Duron will give Intel's Celeron a run for its money. If the Systemax D650 RV Pro is any indication of the standard of the systems to be based on the Duron, then we've got a lot to look forward to. All in all, an excellent buy.

JASON JENKINS

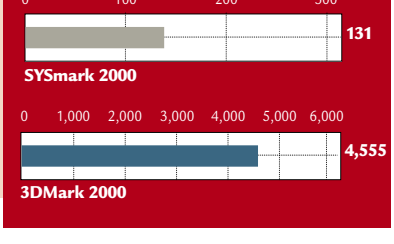
DETAILS

★★★★★

RECOMMENDED PERSONAL COMPUTER WORLD

PRICE £1,056.33 (£899 ex VAT)
CONTACT Simply 0870 729 7366
www.simply.co.uk
PROS Speedy performer for the price; good monitor and graphics card
CONS MicroATX motherboard limits expansion potential
OVERALL A system that shows off the latest technology, but manages to bring it in at a bargain price

PERFORMANCE RESULTS



Atlas Meridian A750T

The Thunderbird makes another appearance in this great system and at a keen price.

On page 76 we take a look at the latest version of the Athlon processor, codenamed Thunderbird, with on-die cache. In that instance, it is still contained in the traditional cartridge but AMD, like Intel, will be moving all its processors onto Socket A in the coming months, and Atlas has given us a superb system based on this new form factor.

The CPU at the heart of the Meridian is clocked at 750MHz, sports 256KB of on-die cache, and demands less in the way of power than the traditional Athlon. Atlas has mounted it on the very latest in motherboard technology, an MSI K7T Pro. This ATX board uses VIA's new chipset, the KT133. This has previously been referred to as the KZ133, but has since undergone a name change. VIA's chipset is essentially a new version of its KX133, redesigned for the new form factor. It supports AGP 4x and ATA 66, along with PC133 SDRAM. Unsurprisingly, then, Atlas has opted for components that take full advantage of both, with 128MB of PC133 memory occupying one memory slot, leaving two free, and a 20.5GB IBM Deskstar hard drive.

Accompanying this is a Guillemot 3D Prophet DDR-DVI. This uses the original GeForce 256 chip from nVidia and has 32MB of DDR memory onboard. Single D-SUB, S-Video and DVI connectors are present, ensuring that you will be able to connect to virtually any device. Unusually, none of the PCI slots are occupied, but this machine does not lack any of the functionality of other machines we review. The board has a new Communication Network Riser (CNR) slot at its base. This is an open industry standard designed to take cards that cover audio, USB, network and modem connectors. Into this is placed one of the new generation of CNR V.90-compatible modems. Audio is onboard, courtesy of the VIA VT686A chip. Atlas also provides a pair of basic Teac two-piece speakers that won't win any awards, but for this price we are not going to kick up a fuss. The CNR modem and onboard audio mean that this PC has huge expansion potential – very few users are going to be able to fill the six free PCI slots, but they are there for you to play with nonetheless.

An eight-speed DVD from Asus sits in one of the drive bays, with the audio properly connected to the motherboard, as it should be. There is also a Mitsumi CD-RW – the 4802TE. This writes at four-speed, and rewrites at two-speed. Those figures hardly break the speed barrier these days, but in the lower price bracket this machine occupies it is still a welcome inclusion.

Atlas' choice of monitor is a real inspiration. The CTX 705F has a 17in Trinitron tube and is capable of a 1,280 x 1,024 resolution at 75Hz. The picture is very easy to look at for long periods and it rounds off the whole package very well.

Build quality is excellent – a large heatsink is present on the new Socket A processor, and an extra fan whirrs at the bottom of the case. This should ensure that the whole box is kept cool, avoiding potential overheating problems. Two 3.5in bays and one 5.25in bay remain free for future expansion, figures that make this system as future proof as is currently possible.

Considering that this is a 750MHz processor, the performance is very good indeed. The new VIA chipset, together with PC133 memory, has helped this machine to score a few extra points in our benchmarks. The SYSmark score of 151 compares very favourably to Mesh's 850MHz Thunderbird on page 76, especially when you consider that this is £500 ex VAT cheaper. 3D performance was similarly impressive, with a 3DMark2000 score of 4,849 and a Quake II score of 78.6fps.

What completes the whole package, though, is its killer price. At only £999 ex VAT, the Atlas Meridian A750T has everything you could ask for – a great monitor, fast performance, the latest technology and large expansion potential.

JASON JENKINS

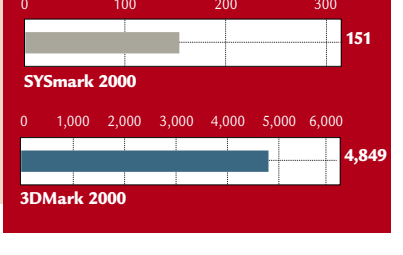
DETAILS

★★★★★

RECOMMENDED PCW COMPUTER WORLD

PRICE £1,173.83 (£999 ex VAT)
CONTACT Atlas 07000 285 275
www.atlasplc.com
PROS Speedy; expansion possibilities; low price
CONS You might want slightly better speakers
OVERALL A great showcase for the latest technology at a killer price

PERFORMANCE RESULTS



Armari R8-2000E

Making use of the latest technology available, this is definitely a workstation that bites.

Configuring a high-end workstation can be tough, but once again Armari has successfully risen to the challenge with its R8-2000E. While often over-used these days, the term workstation still conjures up images of serious kit and in this respect, the R8 impresses the instant you heave it out of the box. The system is housed in a huge dark grey S30-T case from Elan Vital and measures 220 x 437mm at the front, but extends back an enormous 570mm. Once the side is removed, the Intel OR840 OutRigger motherboard looks almost as if it's been banished to one corner.

As its name suggests, the motherboard is based around Intel's high-end 840 chipset that, along with support for AGP 4x and UltraDMA66, boasts dual memory channels, theoretically doubling memory bandwidth. Rather than messing around with memory translators and SDRAM, the OR840 takes RDRAM, to which Intel always intended the 840 to talk.

There are two pairs of RIMM memory slots and the dual-channel nature of the 840 demands that each pair has at least one RIMM fitted. Armari has pushed the boat out by popping a 128MB PC800 RIMM in each pair, supplying a total of 256MB. In theory, the board can take up to 2GB of RDRAM.

The business end of things has not one, but two 933MHz Slot 1 Pentium III CPUs, which, along with the RDRAM, makes the R8 a pretty serious proposition both in terms of performance and price.

It goes without saying that there's plenty of room for physical expansion in the case, with no fewer than eight 5.25in drive bays. Half are occupied by the floppy drive, hard disk, Pioneer 10-speed EIDE DVD-ROM drive and a Mirai CRD-BP2-M 32/12/4 CD-RW, itself connected to a basic Adaptec AHA2930U Ultra SCSI PCI card. Interestingly, the CD-RW features Sanyo's new BURN-Proof technology, which prevents blank discs being ruined by buffer under-run.

The CD-RW drive is the only SCSI device in the system, with Armari instead choosing to use an IBM UltraDMA66 hard disk, which it claims performs as well as the best SCSI models out there. This 30.7GB Deskstar 75GXP spins at 7,200rpm, has an 8.5ms average seek time, 2MB cache and claims an impressive 37Mbits/sec maximum sustained data transfer rate. Armari has installed Windows 2000 Professional on a 3.9GB partition, leaving the rest for data – both volumes are formatted using NTFS.

Joining the SCSI card on the PCI bus is a Creative Labs SoundBlaster Live! 1024 card, which leaves three 32bit PCI slots free. Unusually, for a high-end workstation motherboard, the OR840 doesn't have any 64bit PCI slots, but at least it has onboard 10/100 Ethernet.

Graphics-wise, Armari has fitted a Hercules 3D Prophet II GTS, featuring analog VGA and digital DVI ports, 32MB of memory and the supremely quick GeForce 2 processor. While the card itself conforms to AGP 2x and 4x, the slot on the OR840 motherboard also supports AGP Pro50, which will let up to an additional 50w be delivered to the hungry graphics cards of the future. In order to do this along with keeping a pair of CPUs ticking over, the OR840 features two supplemental power connectors: one that additionally draws from the ATX power supply, and a second dedicated to AGP Pro50 that sucks power out of a standard internal drive plug.

Completing the picture is a smart-looking LaCie Electron Blue 19in monitor, with a crisp Mitsubishi Natural Flat DiamondTron tube, BNC and D-SUB connectors, as well as two upstream and three downstream USB ports. With a 95KHz horizontal scanning frequency, it can display up to 1,600 x 1,200 at 75Hz.

It won't surprise you to learn that a system with these specifications goes like the clappers. Scoring 189 in SYSmark 2000 under Windows 2000, it thrashes every other Windows 2000 system we've tested. Considering it does not have a games-optimised OS, the Quake III Arena score is even more impressive: at 1,024 x 768 in 16bit with maximum detail, it delivered 100.2fps or 107.1fps in SMP mode. Of course, you'll need specific applications to make best use of both CPUs, so we fired up 3D Studio Max and rendered a test frame in 14 minutes, compared to 29 on a dual PIII 550 or 24 on a single 1GHz PIII.

The R8-2000E is quick, but with a pair of high-end CPUs and 256MB of expensive RDRAM, you're looking at a lot of money. Even so, we'd dig a little deeper for an Ultra160 SCSI subsystem as, although the IBM drive performs well, UltraDMA66 doesn't have the expandability or bandwidth to use all those drive bays.

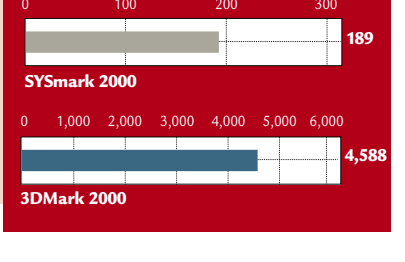
GORDON LAING

DETAILS

★★★★

PRICE £4,598 (£3,914 ex VAT)
CONTACT Armari: 020 8993 4111
www.armari.com
PROS Quick components and roomy case
CONS A SCSI subsystem could make use of all those empty drive bays
OVERALL A well thought out specification for those who need speed, speed, speed!

PERFORMANCE RESULTS



Carrera Academy M800

Forego the DIY option because the Academy Pro provides a great ready-made video-editing solution.

Desktop video-editing systems are thin on the ground. Current choices of out-of-the-box video-editing systems are limited to Apple's iMac DV and a handful of notebooks – Sony's Vaio range and Gateway's Solo 9300 among them. The alternative has been to build your own – extending a multimedia PC, with DV and analog capture and export cards, along with suitable software, but this has been made a minefield by hardware and software incompatibilities.

So Carrera's attempt at producing an integrated video-editing system is welcome news.

The motherboard is an Asus K7V with VIA KX133 chipset housing an Athlon 800MHz CPU. 256MB of RAM is fitted as one 133MHz SDRAM DIMM, leaving two spare slots for expansion.

Two EIDE hard drives are fitted: for OS and applications, a 22.5GB IBM Deskstar; and for video storage, a 40.1GB Maxtor. Both drives spin at 7,200rpm. Extra storage comes in the form of a Ricoh DVD/CD-RW drive. With this you get four-speed DVD and 24-speed CD-ROM performance, coupled with six-speed CD-R and four-speed CD-RW writing. There's also an internal OnStream IDE 30GB tape backup. This provides 30GB of storage hardware. Data writes to the drive at speeds of 50Mbytes/min and the cost of cartridges works out at around £1 per megabyte, making it a more convenient, higher capacity alternative to DAT. Three blank cartridges are supplied.

At the heart of the system is the Matrox RT2000 DualHead graphics processor. This is actually two cards – a version of the Matrox Millennium G400 Flex 3D that provides desktop graphics and realtime preview of digital video effects (DVE), and the RT2000 Codec card that takes care of the video capture and output. A cable connecting the two cards routes analog video to the display adaptor and connects to a neat, robust break-out box with in and out ports for Y/C, composite and S-Video leads. Two IEEE1394 FireWire ports on the RT2000 complete the picture.

In use, the benefits of a well-integrated pre-configured system quickly become apparent. The Carrera is supplied with a full version of Adobe Premiere 5.1 and, having connected a DV camcorder (a Panasonic NV-DA1b) and specified the source for video capture, we were quickly able to view and capture video, making full use of device control to manipulate the camcorder from within Premiere.

Not everyone has had equal success and the DV-compatibility of the RT2000 has become an issue. Matrox has published an extensive list of compatible devices on its website, but the accuracy of this has also been called into question. Fortunately, Carrera is giving potential purchasers the opportunity to try their camcorders out at its London showroom.

Capturing analog video, you have the choice of working in DV or MPEG-2 I-Frame format at bit rates of 10-25fps. While compression rates are not so good, the advantage of MPEG I-Frame is that the software doesn't have to calculate predicted frames in between reference frames, so everything zips along more quickly. You can also sample at reduced frame rates to keep file sizes down, although quality will suffer. You won't need to worry about the 2GB file size limitation – files are automatically and transparently broken into small segments.

Speed in rendering effects and transitions on the timeline is the major benefit offered by the RT2000. Matrox has capitalised on this by providing more than 500 realtime effects and transitions, including page curls, perspectives, scaling, picture-in-picture and organic wipes.

How much realtime effects will be of benefit to you obviously depends on how much use you make of them. Professionals tend to make scant use of such gimmickry, relying on conventional cut, fade and dissolve transitions. Nonetheless, the ability to preview virtual broadcast-quality effects such as page curls in real time is a neat trick you can't help but admire.

Other productivity tools include ACID Music and DVDit LE from Sonic Foundry and Ulead Cool 3D that goes some way to making up for Premiere's poor titling capabilities. DVDit is a DVD video and DVD-ROM authoring application and you can save around 20 minutes of video on a CD in DVD format. You can also upgrade to the full version that adds menu and titling features.

Overall, SCSI versions of the hard drives and OnStream tape drive and a 21in monitor would make a marked difference to the Carerra, but at a price. At this price point it's well suited both to corporate and event video professionals as well as the dedicated amateur.

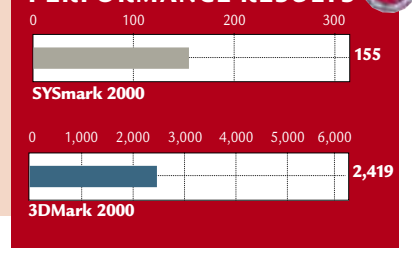
KEN MCMAHON

DETAILS

★★★★

PRICE £3,288.83 (£2,799 ex VAT)
CONTACT Carrera 020 8307 2800
www.carrera.co.uk
PROS Well integrated video-editing studio with a raft of realtime effects
CONS EIDE drives; some RT2000 compatibility issues
OVERALL There is little in the way of competition, but if the performance, integration and value of Carrera's entry sets the standard we've got a lot to look forward to

PERFORMANCE RESULTS



EXCLUSIVE

Viglen Biz Pro A7000PWr

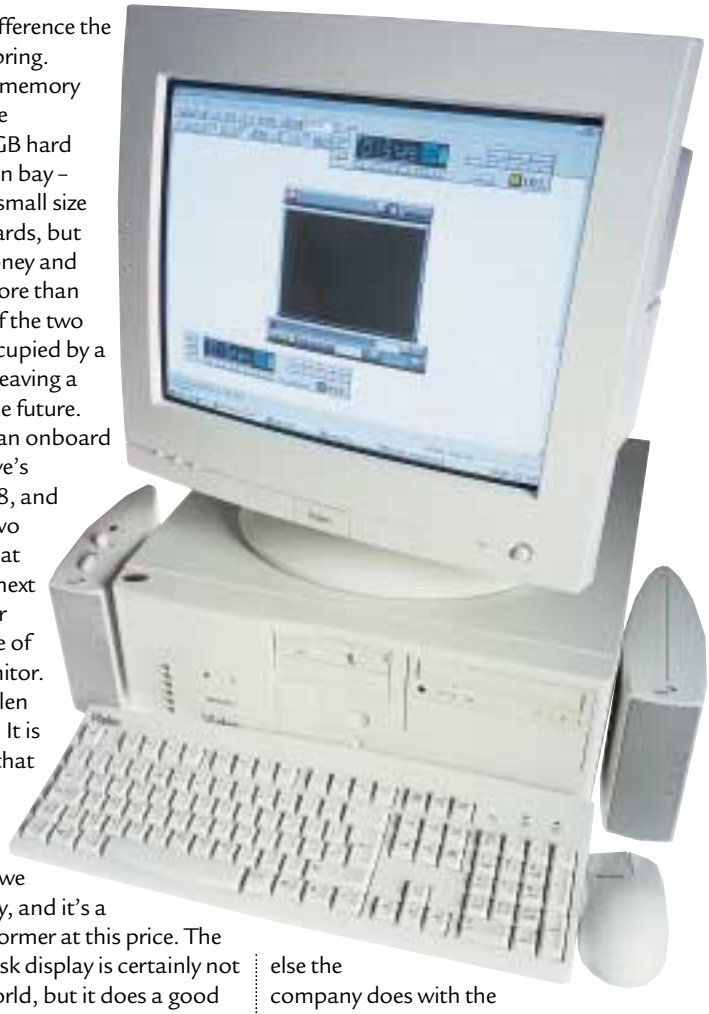
A sneak preview of a great entry-level Athlon system, from a previously Intel-only company.

Viglen has always prided itself on being an Intel-only PC manufacturer – until now. Following Intel's processor shortage it has decided to sell systems based on AMD's chips alongside its existing Intel range, and *PCW* has been able to sneak an exclusive look at the company's first Athlon system. The machine on test is the company's base configuration, and it is certainly being sold at a very attractive price. Viglen is aiming the product at businesses and universities that need a system to perform general office tasks, but don't want to pay through the nose for the latest technology. In this light, it lives up to its intended purpose, but there are a couple of issues that stop the Biz Pro A7000PWr being a five-star product.

For the money, Viglen is selling a fairly fast processor, a 700MHz Athlon with 512KB of off-die cache. Looking closely at the processor, the tell-tale letter A is present in the part code, meaning that this Athlon is built using the more recent 0.18micron technology as opposed to older 0.25micron technology. Viglen's R&D department found AMD's 750 chipset to be more stable during testing, and for this reason it has opted for a motherboard based on this chipset as opposed to a VIA solution.

The MSI motherboard inside this case is of the Micro ATX variety. This seems at odds with the case: Viglen has opted for a full-size ATX desktop. This means there is some wasted space inside, with the system's full upgrade potential unrealised. The reason for this is that the off-die cache, slot version of the Athlon consumes a large amount of power, and this just can't be met by the power supplies in Micro ATX cases. Given this, though, we think Viglen should have opted for a full-size ATX desktop motherboard. It's not a huge issue, though, given that the target customers for this system are unlikely to need to open the case and upgrade. After everything is accounted for, two PCI slots are free on the board.

Inserted in one memory slot is 64MB of PC100 SDRAM. This represents fairly good value for the money Viglen is asking, but we would seriously recommend paying the upgrade fee of around £50 ex VAT to add a further 64MB. As it stands, the system still does a fairly good job, but even if you are sticking to pretty basic, mundane everyday tasks, you'll still appreciate the difference the extra 64MB will bring. There's a further memory slot free for future expansion. A 10GB hard drive sits in a 3.5in bay – definitely on the small size by today's standards, but again, for the money and target market, more than adequate. One of the two 5.25in bays is occupied by a Sony CD-ROM, leaving a further free for the future.



The sound is an onboard version of Creative's SoundBlaster 128, and Viglen supplies two small speakers that can either stand next to the machine or clip on to the side of the supplied monitor. The latter is a Viglen badged ADI E55. It is the same model that Viglen has submitted with most of the review machines we have seen recently, and it's a fairly decent performer at this price. The 17in shadow-mask display is certainly not the best in the world, but it does a good enough job, especially at this price.

The image is supplied by an 8MB version of ATi's XPERT 98. This has a single D-SUB output. It hardly breaks the speed barrier, but then we would not expect this system to do so. It is still a lot better than onboard graphics – you get an AGP 2x slot ready for a new graphics card should you find the money for one.

Build quality is excellent, and this is especially reassuring considering that this is Viglen's first Athlon venture. The processor itself is kept amply cool by a large heatsink, backed up by two fans. The interior is very tidy indeed, with cables kept well out of the way of any moving parts.

All things considered this is a good package at a very attractive price. We'd liked to have seen an ATX motherboard in this case, and we would also recommend upgrading to 128MB of memory, but for the money we can't complain too loudly. Crucially, though, Viglen has built a system that meets the needs of the Athlon well, and we look forward to seeing what else the company does with the processor. If you are looking for an entry-level system, then it is certainly well worth taking a look at the Biz Pro.

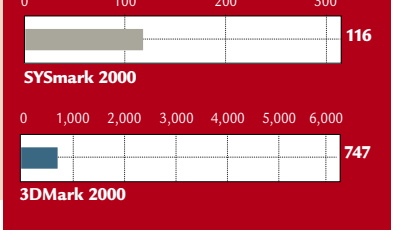
JASON JENKINS

DETAILS

★★★★

PRICE £799 (£680 ex VAT)
CONTACT Viglen 020 8758 7000
www.viglen.co.uk
PROS Fast processor; good value
CONS Micro ATX motherboard in ATX case; could do with more memory
OVERALL A good entry-level workhorse and well worth a look

PERFORMANCE RESULTS



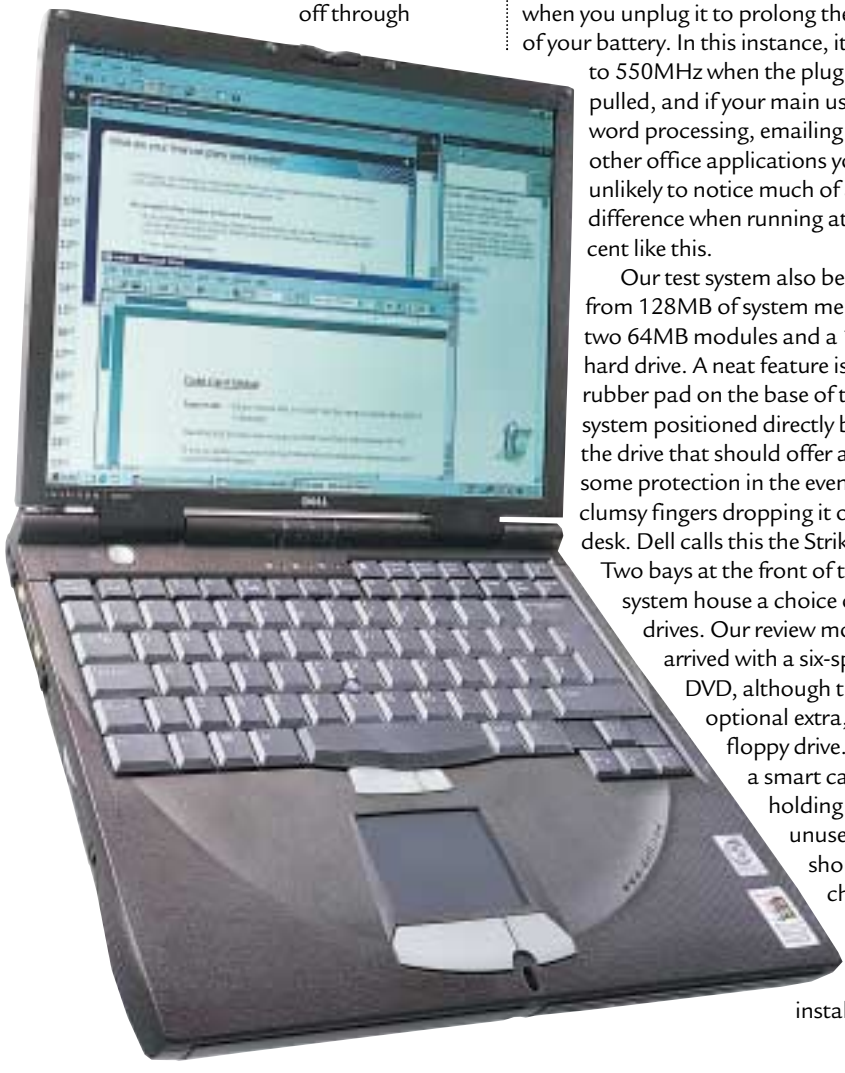
Dell Inspiron 3800

A worthy successor to the 3700 with a great keyboard and screen plus a good software bundle.

Dell's Inspiron 3700 quickly established itself as a classic machine. Less than a year old, it has a dedicated following here at *PCW* thanks mainly to its screen, keyboard and versatile construction. It is also available in a range of colours, each of which is more tasteful than the iBook. Now the next generation of neapolitan notebooks, the 3800, has been released.

As with the rest of the Dell range, the 14.1in screen is difficult to fault. It has an impressive viewing angle and a consistent lighting level across its full surface. There are none of the darker corners you sometimes find with poorer displays. This is driven by an 8MB ATi Rage Mobility M-1 chipset.

There's a choice of trackpoint or fingerpad for moving the mouse around the screen. These come complete with alternative click buttons, so whatever your preference you should be happy with this notebook, and if you find either option a distraction they can be turned off through Windows Control Panel. The keyboard, too, is first class. Full size, it can rival any desktop keyboard, and the keys have a generous travel that makes typing comfortable and satisfying, if such a thing is possible.



One thing about our review system that did not particularly grab us was the colour. On the outside it's conventional enough, but inside you'll find a rusty brown plastic. Dell terms this Sierra Maroon. We preferred the Tahoe Blue and Midnight Grey, but depending on your décor you may opt for Forest Green. Whichever you like, it'll help differentiate your machine from any others in the office.

The hub, as far as this system is concerned, is the 700MHz SpeedStep Pentium III. This is not the first SpeedStep machine we've had in for review, but if you've been living with your head in the sand for the past few months, what it means is your notebook will automatically crank down the speed when you unplug it to prolong the charge of your battery. In this instance, it drops to 550MHz when the plug is pulled, and if your main use is word processing, emailing and other office applications you're unlikely to notice much of a difference when running at 80 per cent like this.

Our test system also benefited from 128MB of system memory in two 64MB modules and a 12GB hard drive. A neat feature is the rubber pad on the base of the system positioned directly below the drive that should offer at least some protection in the event of clumsy fingers dropping it onto a desk. Dell calls this the StrikeZone.

Two bays at the front of the system house a choice of drives. Our review model arrived with a six-speed DVD, although this is an optional extra, and a floppy drive. There's a smart case for holding the unused drive, should you choose not to have both installed at once, and bundled Softex Bay Manager to allow for hot swapping, although this is not pre-installed.

A quick tour around the unit's four sides reveals a proliferation of ports. To the right there's audio sockets for mic, headphone and line in and composite video out, which will be put to good use if you fancy watching DVDs on a television, making this notebook an especially good choice for the business traveller unwilling to pay for hotel movie channels and also lets you effectively explain away £150 of the cost in what you have saved by not buying a consumer DVD player. Behind the keyboard you'll find serial, parallel and a single USB port, external monitor connectivity and the docking interface, and along the left-hand edge there is a Kensington lock point and support for one Type III or two Type II PC Cards. In one of these was a Psion Dacom Gold Card modem while the other held a blanker.

In terms of software, the 3800 comes with Microsoft Works Suite 2000, which includes a full copy of Word 2000 as well as Money 2000, Encarta World Atlas and Autoroute Express Europe, plus Norton AntiVirus 2000.

The 3800 is a well-constructed machine that's pleasant to use. Our only complaint was the slightly oversensitive trackpoint – it was very easy to tap while typing, repositioning the cursor without us realising. That aside, though, the keyboard and screen, the two factors that can make or break a notebook review, are truly deserving of high praise, making this machine a worthy replacement for the excellent 3700. It also comes with a year's collect and return service anywhere in Europe at no extra cost.

NIK RAWLINSON

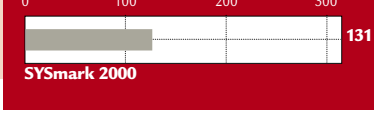
DETAILS

★★★★★

RECOMMENDED Personal Computer World

PRICE £1,902.33 (£1,619 ex VAT)
CONTACT Dell 0870 152 4699
www.dell.co.uk
PROS Keyboard; screen; flexible configuration options
CONS Oversensitive trackpoint
OVERALL A great machine at a fair price

PERFORMANCE RESULTS



Saintsong Espresso PC

One for gadget freaks everywhere, the PC with a tiny footprint is an amazing piece of engineering.

Since its appearance at the CeBIT show in Hanover, the Espresso has generated quite a buzz on the Internet. The device was even name-checked as an example of the future of PCs by Bill Gates in his WinHEC speech. Naturally, then, we were keen to get our hands on the unit for a full review.

The first thing that hits you about the Espresso is its tiny footprint. About half the size of a ZX Spectrum, the device really is very petite. Even its docking station is tiny, being only slightly larger than the main unit, yet it manages to house both a CD-ROM drive and a floppy disk drive.

When we turned the unit on for the first time we were a bit surprised that it didn't seem to want to boot. Then we realised that there was no operating system installed. In fact the hard disk hadn't even been partitioned. However, once we had loaded Windows 98 onto the Espresso and installed the drivers from the CD-ROM that ships with the unit, we were quite surprised by how sprightly it was. This is no doubt thanks to the 500MHz Celeron, 64MB of RAM and 6.4GB hard drive – packing such a punch is no mean feat for a unit this size.

The motherboard used by the Espresso is based on the Intel 810 chipset and is an adapted mini board PC often used for industrial applications. We had expected the unit to get quite hot after it had been operating for a while, but this was not the case. In fact, it was reasonably cool to the touch, although the fan was on the noisy side.

Despite its small size, the Espresso doesn't skimp on sockets and ports. The left-hand side houses an earphone and a mic socket while the top edge of the unit is home to the keyboard, mouse, S-Video and D-SUB sockets. The mouse connector isn't necessarily vital as staring up at you from the face of the unit is a standard laptop-style touchpad, above which you'll find two buttons for scrolling up and down through documents or web pages.

Looking at the right-hand side you'll find two USB ports and the docking port. At the very bottom of the Espresso is a volume control.

A further unit that houses the floppy and CD-ROM drives, parallel and serial ports attaches to the main unit via a connector at the side. It has a further two USB ports as the USB ports on the main unit are obscured when the unit is docked.

Despite its plus points there are a few downsides to the Espresso. For one, it's not the most attractively styled device that we have seen, and the plastic casing feels a touch flimsy.

Also, while 64MB of memory is not to be sniffed at, there doesn't seem to be a way for the user to upgrade the unit's memory. There's no panel that can be removed to give you easy access to the memory slots. The manual said you should contact your dealer for memory upgrades. This is a shame as it uses standard notebook memory.

There are also some issues with the docking station. The Espresso can't be hot docked. Instead you have to turn it off, connect it and then reboot. Also the connection between docking station and the Espresso leaves a lot to be desired. The slot on the docking station is the same size and shape as a standard AGP port with the connector on the Espresso attached directly to the main board of the mini PC. When you connect them together they feel less than secure and we felt that the unit really should have some mechanical locking latch to secure the two devices together.

We really loved the Espresso as its small form factor is a real attraction, but it does fall between two stools in terms of who would actually buy the device. On the one hand it could be seen as a replacement for a laptop, but then there is no built-in screen and no battery power. It's also unlikely that you would use the unit as a full-time desktop PC.

Nevertheless, the Espresso does offer the ability to carry a fully functioning PC around with you from meeting to meeting, or between your home and the office, and the S-Video output is a good addition for those who need to do quick presentations where a projector is not available. The unit could conceivably be used on the road, as the TV-out would allow you to plug it into those hotel TVs that have a video in socket. Be warned though, as with any TV out facility, the picture is no match for a monitor and you'll have to increase the font size in Windows to read text easily.

At the time of writing, no European distributor had been signed, but the Espresso is selling in Taiwan for around £800. If it's around this price when it debuts in the UK, it should be a winner.

The Espresso is an amazing feat of engineering, and if you can find the right use for it you'll fall in love with it – and be the envy of gadget freaks everywhere.

NIALL MAGENNIS

DETAILS

★★★★

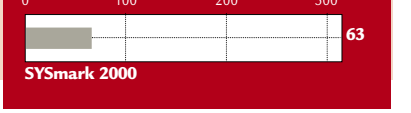
CONTACT www.saintsong.com.tw

PROS An amazingly small footprint for a fully functioning PC; USB ports mean lots of expansion potential; nifty processor for such a small device

CONS Doesn't look very attractive; fan is a touch on the noisy side; docking port connection feels fragile

OVERALL A true engineering wonder, it really is amazing how Saintsong has managed to pack a fully functioning PC into such a small form factor. However, a laptop could be a better buy

PERFORMANCE RESULTS



EXCLUSIVE

Kyocera VP-210

Seeing is believing, and Kyocera's video phone will let you do just that, all in a tiny mobile package.

One of the favourite pieces of technology in science fiction films and TV shows is the video phone. It seemed that no self-respecting sci-fi hero could do without his video phone to keep in touch with his colleagues. More often than not, the video phone was strapped to the wrist like a watch, with a small screen displaying the image of the person at the other end of the call, and even though there was never an evident lens in the device, the other person was also treated to an image. What is always most amazing about the video phones in the movies is that, no matter where the device is held, the correspondent is always treated to a perfectly framed image of the caller.

Although video phones have been available for a little while now, it's only been fixed base models. Of course, some people will want to have a video phone in their house so they can see the person they're talking to, but there are a couple of issues with such a setup. First and foremost, you'll only be able to see callers who also have video phones, of which there aren't likely to be many. The other issue is that most people like to relax while they're at home, and the thought of having to look your best all the time in case the phone rings is not appealing.

That said, the idea of having a mobile video phone as seen in the movies has significant benefits. One of the best things about a mobile phone is that it's a lifeline. If you're meeting someone and you're lost, it's easy to give them a call and ask for directions. However, describing to someone where you are isn't always easy, but if you can show them where you are it's a different matter altogether. In fact, the ability to show things to the person at the other end of the phone would be very useful in countless careers. However, what's most amazing about the idea of mobile video phones is that they already exist.

Kyocera is a company best known for its high-quality laser printers, but printers aren't the only thing that this Kyoto-based corporation produces. A few months back we looked at a satellite phone produced by Kyocera, which incorporated a removable GSM phone. Unfortunately, the Iridium network has recently shut down, but the phone itself was a well-designed and useful unit. Now Kyocera has expanded its development in the mobile communications arena and produced the VP-210 Visual Phone.

Working in this industry makes you very jaded and it takes a very special product to make the *PCW* staff stop in their tracks with awe, but the VP-210 is one of those products. Without a doubt the VP-210 is a landmark product and represents the future of mobile communications.

When Kyocera first told us about the Visual Phones we expected them to be bulky, unattractive and heavy, but how wrong we were. The VP-210

is a beautifully styled unit, resplendent in silver, giving it the kind of futuristic look you'd expect from a product such as this. The dimensions are only 135 x 50 x 20mm (h x w x d) and it weighs in at a svelte 160g.

A large area of the phone is made up of the TFT screen that measures 40 x 30mm (h x w). This is a truly excellent display, producing an impressive image in full colour. Mounted just above the screen is the lens that captures your image for transmission to the correspondent. Below the screen is the keypad, which is similar to a standard mobile phone.

Making a video call is simple; just press the VP button followed by the number of the phone you want to call then the call button. If you just dial the phone number without first pressing the VP button you'll make a voice-only call. The TFT screen will display the image transmitted from the other phone as well as a small picture of what your phone is seeing in the corner. This allows you to make sure that your face is framed properly for the other caller. The update appears to be around five frames per second, so it's far from realtime video, but it's impressive nonetheless. The only real problem with the design is the fact that the lens can't be moved; it's always facing in the same direction as the screen, so it's difficult to frame something other than your face for the other caller to see. Ideally, the lens should be able to swivel from front to back and vice versa. That way you could point it at something and still make sure that the image is adequately framed for the correspondent. There's also a stand at the rear of the phone that clips out, allowing the unit to be placed on a desk for more comfortable conversation.

Obviously you can't hold the phone to your ear while you're making a call since all the person at the other end will see is a very close-up shot of the side of your head, and likewise you won't be able to see them. To overcome this problem the phones ship with hands-free earpiece and microphone sets, much like those available for most GSM phones.

This allows you to talk and listen freely while still looking at the phone's screen. Using the phones in practice didn't even illicit a second glance from passers by, since so many people use their standard mobile phones in this manner, bizarre though it is.

Unfortunately, these Japanese units don't use the GSM standard, although Kyocera is planning to release GSM versions for use with standard mobile phone networks. The VP-210 uses a wireless protocol similar to digital walkie-talkies, which provides good reception but is limited by the range of the units, since there are no cells to bounce the signal off, as with GSM phones. We found that there was a usage range of about half a mile between the two units in a built-up city environment.

Of course, this limits the use of the phones, but in some cases the lack of GSM compatibility is a good thing. GSM phones can't be used in hospitals

because the signal interferes with the equipment, but the VP-210 phone can be used without any such issues.

Unsurprisingly, this is one of the key areas of sale in Japan. Visual Phones have also become essential at dating agencies where clients can see and speak to each other without having to meet face to face.

Of course, it would be a waste to have a CCD and a TFT display in a unit without the ability to capture pictures, and Kyocera hasn't overlooked this feature. Under the menu you'll find a 'snap' mode that allows you to use the phone as a digital camera. Unfortunately, in their present state there's no way of downloading the images to a computer, but again this is a feature that Kyocera plans to implement in future models. You can, however, scroll through the saved images using the volume up and down buttons at the side of the unit. You can also increase and decrease the contrast of the images and re-save them. Add to this the ability to send captured stills to another phone, and the Visual Phone starts to look like a formidable piece of mobile comms hardware.

Obviously the Visual Phone is a far from mature product, but it is the basis for the next step in mobile technology. Even if Kyocera produced GSM models for Europe tomorrow, the chances are that the bandwidth would not be sufficient to transmit the video. That said, with GPRS not too far away now, the limited GSM bandwidth might not be an issue for long.

Kyocera has to be commended for producing such a pioneering product and one that's been considered the next step in communication for a very long time. Although the units are already available in Japan, there was no release date for the UK at the time of writing, but let's hope that it doesn't take too long for Kyocera to modify the Visual Phones for the UK market. Even though the VP-210 isn't perfect in its current form, it's still a superb product and one that deserves worldwide exposure.

RIYAD EMERAN

DETAILS

★★★★

PRICE Only available in Japan, approx 40,000yen (£245)
CONTACT Kyocera **www.kyocera.co.jp**
PROS Amazing technology; light and attractively designed; tomorrow's phone today
CONS Only available in the Far East; no GSM compatibility yet
OVERALL Kyocera has come up with a ground-breaking product that takes mobile communication to the next level. A European GSM version of this phone would be a fantastic product, although we'll probably have to wait for the roll-out of GPRS first

Kenwood 72X TrueX

Reading large files quickly is no problem for this CD-ROM drive and Zen's multibeam technology.

Built around Zen Research's multibeam technology, this 72-speed TrueX CD-ROM is a very, very fast drive – at least when it comes to reading very large files. A standard CD-ROM drive consists of a single, narrow laser beam that reads the data on the disk. Zen's technology splits the reading laser into seven beams, allowing seven tracks to be read at once. The gathered information is interpreted by a custom chip that processes the information in parallel, as opposed to the serial chips in other CD-ROMs.

We tested the drive's ability to perform various read tasks against a 52-speed Creative CD5220, with mixed results. In a large single file read test, the drive performed miraculously, with 507MB transferred in a mere 54 seconds. The Creative, by contrast, completed the same task in one minute 35 seconds. Transferring mixed small files, though, revealed a more mediocre performance: 214MB took two minutes 17 seconds, compared to the Creative's one minute 16 seconds.

Browsing 44 Paint Shop Pro images, with file sizes totalling 203MB, highlighted a less marked performance deficit, with the Kenwood completing the task in one minute 24 seconds compared to one minute seven seconds from the Creative.

The Kenwood is clearly an excellent drive if you plan to read very large files, appealing to those who need to access high-quality video without disc caching. For broad-spectrum reading purposes, though, the drive is weaker than existing units. Depending on what you need to use your CD-ROM for will ultimately determine whether the Kenwood would be a wise purchase or not.

SCOTT MONTGOMERY

DETAILS

★★★★

PRICE £116.32 (£99 ex VAT)
CONTACT Kenwood 00 353 61 702018 **www.kenwoodtech.com**
PROS A very quiet drive with excellent large file read times
CONS It can't read smaller files as quickly as other fast drives; high cost
OVERALL If you need a CD-ROM drive to read large files quickly, then this is a good bet. If not, then there are faster, cheaper alternatives out there

Intel 815 Motherboard

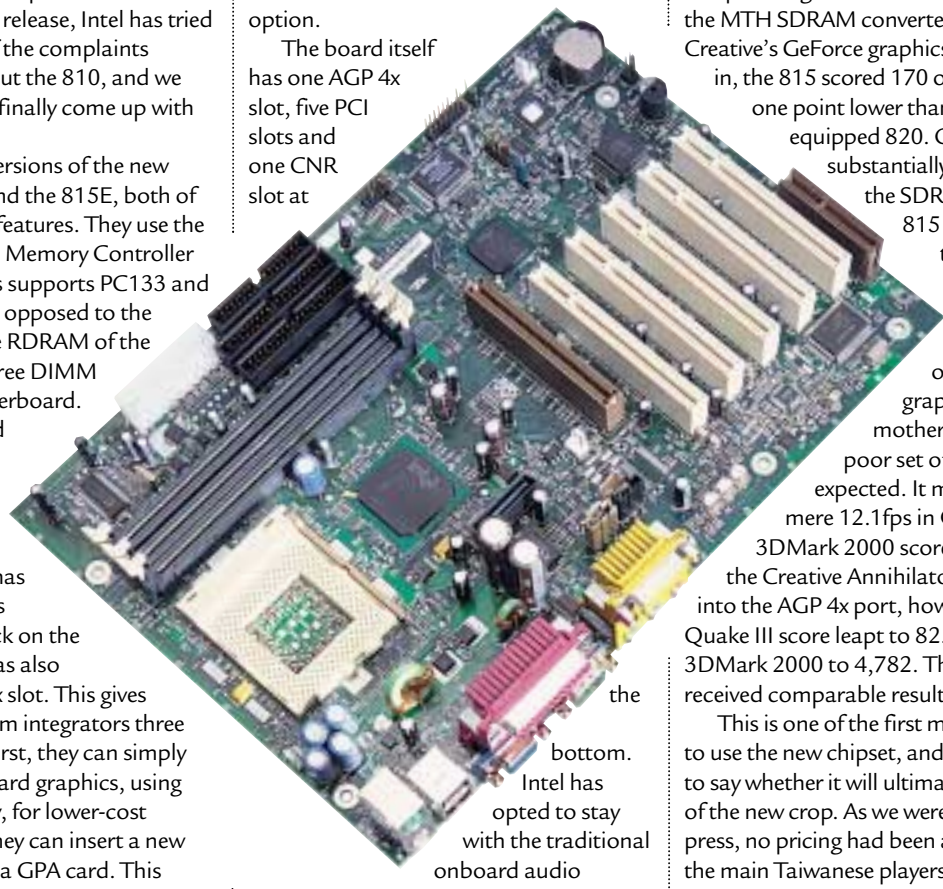
Intel's been listening to its customers, and has produced a chipset that could turn out to be a star.

After the disappointing events surrounding Intel's last chipset, the 820, the company has a lot to make up for with its new release, the 815. This latest offering is an evolution of the 810 chipset, and is intended for use with the latest Flip Chip Pentium IIIs and Celerons. With this release, Intel has tried to address many of the complaints customers had about the 810, and we think it might have finally come up with a winner.

There are two versions of the new chipset – the 815 and the 815E, both of which have similar features. They use the same Graphics and Memory Controller Hub (GMCH). This supports PC133 and PC100 SDRAM (as opposed to the hideously expensive RDRAM of the 820), with up to three DIMM slots on each motherboard. It provides onboard graphics, with a 230MHz RAMDAC and limited 3D acceleration. Intel has finally listened to its customers' feedback on the 810 though, and has also included an AGP 4x slot. This gives end users and system integrators three possible options. First, they can simply stick with the onboard graphics, using the system memory, for lower-cost systems. Second, they can insert a new card, referred to as a GPA card. This plugs straight into the AGP slot and extends the display cache of the motherboard to improve performance. Finally, for faster 3D acceleration, users can plug any AGP 4x graphics card into the AGP slot, disabling the onboard graphics entirely.

A new slot, the Communication Network Riser (CNR), has been introduced. This is a similar concept to the old AMR slots, but has more expansion potential. The slot is designed to take small, cheap CNR cards that can provide extra modem, audio, USB and LAN ports, and many OEMs are expected to take advantage of this to produce lower-cost PCs.

We've taken a look at one of Intel's own motherboards, the D815EEA, based on the new 815E chipset. This has all of the features above, but also sports a second-generation I/O Controller Hub (referred to as ICH2). This supports ATA 100 for the latest hard drives (as well as older ATA 33 and 66 drives), four USB 1.1 ports and integrated LAN options. It also has improved soft Audio, enabling six-channel, Dolby Digital 5.1 sound through traditional onboard connectors or a CNR option.



The board itself has one AGP 4x slot, five PCI slots and one CNR slot at the bottom. Intel has opted to stay with the traditional onboard audio connector with this model, and these are in the usual position. There are three DIMM connectors, with the two IDE, and single floppy and ATX power connectors placed at the far right of the board. Intel has made use of the new chipset's functionality and positioned a DVI connector next to the onboard audio. This could connect to a backplate card via an appropriate cable.

We wanted to see how good the new chipset is, and ran a series of tests to compare it to an existing 820 solution. In our 815E system, we used a Flip Chip Pentium III 866 processor, 128MB of PC133 SDRAM, IBM's new 45GB ATA 100 hard drive and a Creative Annihilator Pro. In the 820 system, we used an Asus P3C motherboard with 128MB of PC800 RDRAM, and a Slot 1 Pentium III 866EB with the same components and graphics card drivers. We also tried Asus' SDRAM converter to see how an 820 board with the now suspended Memory Translator Hub (MTH) compared. The results showed the new chipset in a positive light. Using onboard graphics, the D815EEA managed a SYSmark 2000 score of 156, one point higher than the 820 board with the MTH SDRAM converter. With Creative's GeForce graphics card plugged in, the 815 scored 170 on SYSmark, one point lower than a RAMBUS-equipped 820. Considering the substantially lower cost of the SDRAM in the new 815 motherboard, that is a pretty good set of results.

Using the onboard graphics, the 815 motherboard gave a poor set of 3D results, as expected. It managed a mere 12.1fps in Quake III and a 3DMark 2000 score of 889. With the Creative Annihilator Pro plugged into the AGP 4x port, however, the Quake III score leapt to 82.9fps, and the 3DMark 2000 to 4,782. The 820 board received comparable results.

This is one of the first motherboards to use the new chipset, and so it's difficult to say whether it will ultimately be the best of the new crop. As we were going to press, no pricing had been announced. All the main Taiwanese players will be bringing out their own versions in the near future, and these may well improve on what we have here. This board was very easy to configure, though, and would be a good choice for consumers who don't want to be overwhelmed with too many BIOS options. As for the 815 itself, it looks as if it has the potential to be a great chipset, and we look forward to seeing more PCs based on it.

DETAILS

★★★★★

CONTACT www.intel.co.uk

PROS AGP 4x slot as well as onboard graphics, supports PC133 SDRAM

CONS It's still early days and there are bound to be a few compatibility issues initially

OVERALL The 815 is what customers have been asking for in a chipset for ages and Intel has finally delivered

Sony Cyber-shot DSC-S70

This high-quality 3.3megapixel camera sits on top of the pile when it comes to all-round value.

Sony's DSC-S70 is the superior of two new S-series Cyber-shots, where the S stands for stamina, or increased battery life. While most other digital cameras are good for around 60-90 minutes' solid use, the S70's powerful lithium-ion battery lasts for 120-150 minutes; it's also one of Sony's clever InfoLithium models, which tells you exactly how many minutes you've got left. The battery also recharges in as little as 90 minutes, compared to just over half a day for a set of four nickel metal hydride (NiMH) AAs.

Looks-wise, the S70 is a departure from the innovative 2.1megapixel F505 Cyber-shot (*PCW* Dec 1999), instead favouring a conventional boxy design. Measuring 125 x 62 x 39mm, and weighing 280g without battery, it's reasonably compact, but there's little on the S70 that's particularly comfortable to grip.

The S70 is Sony's first genuine 3.3megapixel camera, delivering no fewer than 2,048 x 1,536 pixels, which is sufficient to produce a great-looking 10 x 8in photo. There's only one JPEG setting, creating files of around 1.3MB, resulting in only five pictures on the standard stingy 8MB Memory Stick – most 3.3megapixel cameras are supplied with 16MB. If memory is tight, you can switch to lower 1,600 x 1,200, 1,280 x 1,024 and 640 x 480 modes.

An uncompressed TIFF mode delivers 9MB files, while an email mode produces small 320 x 240 pixel images. Interestingly, both modes also generate a normal 2,048 x 1,536 JPEG image at the same time. Finally a text mode saves a mono GIF image for cleanly capturing black or white boards or pages of text.

The S70 and the new 2.1megapixel S50 are the first Cyber-shots to employ optical viewfinders in addition to their colour LCD displays – handy for saving power and when you can't see the screen in bright conditions. The S70's 2in display is extremely sharp and allows you to zoom in and scroll around images during playback, but it takes a few seconds for the lens to retract first.

Speaking of which, the S70 is equipped with a 3x optical zoom from Carl Zeiss, equivalent in focal length to a 34-102mm lens on a 35mm camera; the actual specification is 7-21mm f2~2.5.

Macro mode works as close as 4cm in wide mode, and there's also the choice of autofocus or seven manual focus steps.

While the F505's longest exposure was a mere 1/8 second, the S70 boasts exposures as long as eight seconds, and 19 other shutter speeds up to 1/1,000 second. Aperture adjustment has been improved with a six-blade iris (two-blade on the F505), offering nine steps from f2.0 to f8.0, as well as effective control over depth of field using aperture and shutter priority modes. Exposure compensation is available from +/- 2EV in 1/3 stops, compared to the coarser 1/2 stops of the F505 and there's a spot-metering option.

The flash, too, can be adjusted to fire brighter or dimmer than normal, along with the usual force on, off, and red-eye modes; rather impressively, there's also a sync option to an external flash unit. White balance is adjustable and for novelty value you can apply solarisation, sepia, black and white and negative effects to images.

Movie mode captures up to 15 seconds of video at 320 x 240 (measuring 5.2MB) or 60 seconds at 160 x 120, both at 15fps with mono audio. The files are stored as MPEGs, compatible with Windows media player, and the 320 x 240 mode fills your TV screen when connected to the camera's composite video output. It's surprisingly good quality, but sadly the zoom is disabled.

Once connected to your PC over USB, the camera memory is mounted as a removable drive to drag files from; Sony supplies MGI PhotoSuite 8 to get started. Standard top-resolution JPEGs took four seconds to transfer, while uncompressed TIFFs arrived in just over 20 seconds.

Image quality is superb, and standard JPEGs suffer from few undesirable compression artefacts. The lens optical quality is also good, and when teamed up with the high-resolution CCD and improved 12bit A-D conversion, supplies clean, sharp pictures free from distortion.

Don't underestimate the impact of larger images though. Standard JPEGs are written in a couple of seconds, but uncompressed TIFFs can take 40 seconds. A movie that is 15 seconds long and 320 x 240 takes 12 seconds to write and six to buffer before playing. The S70 also takes five seconds to boot up. It's not nearly as responsive as the older F505, but such times are typical on most 3.3megapixel cameras.

Overall, the S70's image quality is at least as good as Canon's S20 (*PCW* June), while boasting far more control in a box that's only slightly bigger. Nikon's CoolPIX 990 (see next page) offers more still, but it's bigger and more expensive. Consequently, until we test forthcoming models from Epson and Olympus, Sony's S70 looks like the best out there.

GORDON LAING

DETAILS

★★★★★

PRICE £750 (£638.30 ex VAT)
CONTACT Sony 0990 111 999
www.sony.co.uk
PROS Great quality; good control; long battery life
CONS 8MB memory is half the size of the competition
OVERALL The best value all-round 3.3megapixel camera so far

Nikon CoolPIX 990

With image quality second-to-none and features galore, this digital camera won't disappoint.

Nikon's CoolPIX 990 may physically resemble the earlier swivelling 950 model, but there are plenty of differences under the new, tough, magnesium-alloy hood. Most crucially, it's Nikon's first 3.3megapixel digital camera, and it's good enough to produce a great looking A4-sized photo.

As well as the full 2,048 x 1,536 and the 3:2 ratio 2,048 x 1,365 pixel modes, the 990 also offers lower 1,024 x 768 and 640 x 480 modes to save space. There's a choice of three levels of JPEG compression, the best quality producing files measuring just over 1MB at full 2,048 x 1,536 mode. Nikon supplies the standard 990 with a 16MB Compact Flash card that will store around 10, 20 or 40 highest resolution pictures depending on the compression. There's also an uncompressed TIFF mode that produces 9MB files.

Sadly, the 990's CF slot won't take the IBM Microdrive, but at least Nikon has moved the slot to the side of the unit – the 950's slot was underneath, which rendered it inaccessible when the unit was tripod mounted.

Like Nikon's other digital cameras, the 990 comes with a set of four nickel metal hydride (NiMH) AA batteries and a charger that will fill them up in around 12 hours – these last for around 1.5 hours in the 990. This is thrashed by lithium-ions in cameras such as Sony's S70 (see previous page), but a spare set of AAs is about six times cheaper.

Some power is saved on the 990 thanks to a smaller 1.8in display, compared with the 2in screen on the 950; it's still very clear and allows you to zoom in up to four times and scroll around images during playback. There's also an optical viewfinder.

Nikon is well known for its high-quality lenses and the new optics in the 990 don't disappoint. The 3x optical zoom is equivalent to a 38-115mm lens on a 35mm camera; the actual specification is 8-24mm f2.5~4.0. Like the 950, the 990 will focus as close as 2cm, but zooming has been speeded up by 20 per cent. Nikon has also improved the speed of the autofocus by 30 per cent over the 950 and the 990's incredible 4,896 auto-focusing, or 50 manual-focusing steps are remarkably fine compared with the rest of the market. The 990's continuous or single auto-focus modes can also aim for selectable areas just like the high-end F5 SLR.

A new motor-driven seven-blade iris diaphragm offers 10 aperture settings from f2.5 to f7.0 and fine control over depth of field in aperture-priority mode. Shutter-priority offers no fewer than 14 shutter speeds from 1/1,000 to eight seconds, while manual mode boasts a bulb setting of up to 60 seconds. Yes, that's right, a totally manual mode and the opportunity to use an optional USB cable release lead.

Alternatively, the automatic program does a great job, especially with the choice of 256-segment Matrix, centre-weighted or spot metering. There's also exposure compensation from +/- 2EV in 1/3 stops, optional five-step bracketing, and Nikon's Best Shot Selector just to make sure.

The built-in flash can be forced on, off, reduce red-eye, slow-sync or fill-in and there's a terminal to connect to selected external Nikon Speedlights. The 990 is also Nikon's first to feature a movie mode, which can grab up to 40 seconds of 320 x 240 video at 15fps and save them as M-JPEG QuickTime files; these also fill a TV screen when connected to the 990's composite output. There's no sound, but you can use the zoom while recording. Burst-capture modes include one that takes up to 80 QVGA images at 30fps.

Surprisingly, the 990 is Nikon's first to employ a USB connection and it's not a moment too soon. The supplied Nikon View software doesn't mount the camera as a PC drive, but it does let you simply drag and drop images. Best quality JPEGs took around five seconds to transfer, while 9MB TIFFs required 35 seconds. Nikon also claims some direct camera control from the PC.

Like Sony's S70, the 990 suffers from prolonged times to handle such large images. While both booted up in five seconds and took 40 seconds to write a TIFF, the 990 was slower, taking 15 seconds to write a 4MB 15-second movie and 15 more seconds just to buffer it before playing. Replaying TIFFs was equally laborious.

This appears to be the price you pay for such quality though. While the 990's images are only fractionally better than the Sony S70, they're still the best we've seen. Where the 990 scores above and beyond anything else are its controls. Just when you think you've seen it all, you find the unique histogram facility in playback mode – brilliant.

Certainly, Nikon's 990 is neither small nor cheap, but it feels great, and is simply unrivalled in terms of features. If you've got £850 to spend on a high-end digital camera, this is the one to get.

GORDON LAING

DETAILS

★★★★★

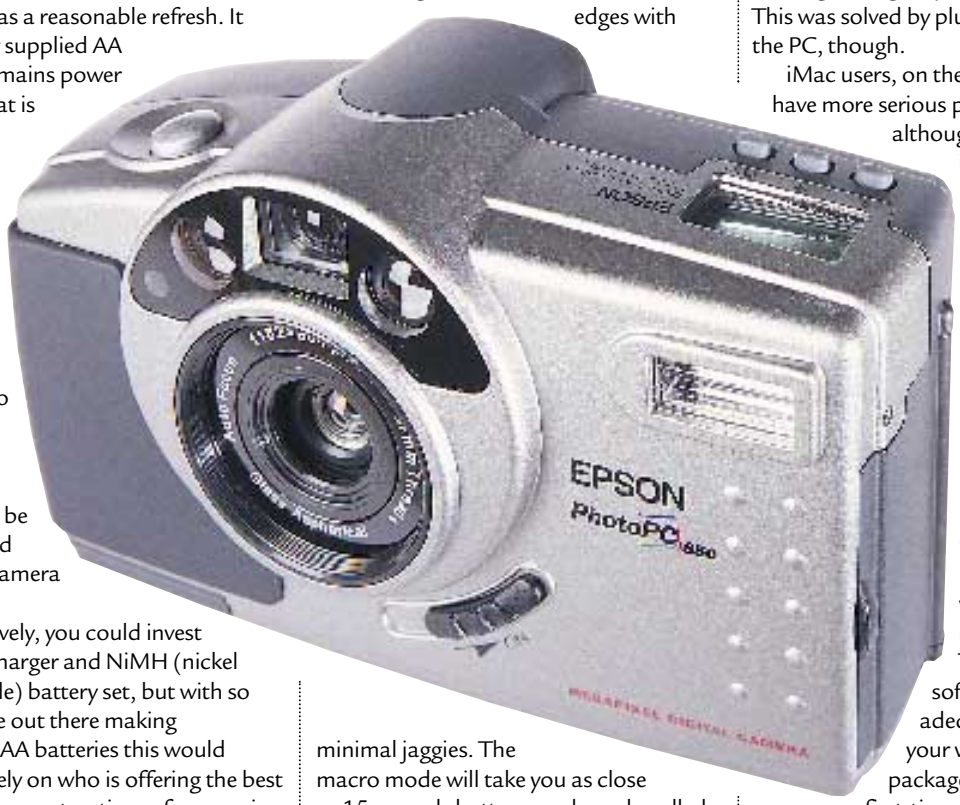
PRICE £849 (£722.55 ex VAT)
CONTACT Nikon 0800 230 220
www.nikon.co.uk
PROS Unrivalled control and superb image quality
CONS Large image handling is slow
OVERALL Expensive, but it's the best and semi-pros will love it

Epson PhotoPC 650

This budget digital camera offers quality images and is a great buy if you can manage without USB.

It's a couple of years since Epson released the PhotoPC 600, and not only have the version number and design changed with the 650, but also the resolution has been upped from 1,024 x 768 to 1,152 x 864 and the number of quality settings jumps a notch to four.

Familiar functions such as macro and self-timer remain in place, but the internal memory has been removed. This is replaced by a bundled 8MB Compact Flash card, but it retains the easy-to-use sliding switch for selecting LCD framing, image playback or LCD off, and control of a similar horizontal menu is through identical back-mounted buttons. The 1.8in LCD has a reasonable refresh. It runs on four supplied AA batteries or mains power via a lead that is available as an optional extra, although to take advantage of this latter option you'll have to leave the unit's side door open, which could be awkward and expose the camera to damage.



Alternatively, you could invest in Epson's charger and NiMH (nickel metal hydride) battery set, but with so many people out there making rechargable AA batteries this would depend largely on who is offering the best price. The cheapest option, of course, is to leave the back panel switched off and use the optical viewfinder instead.

More conventional in appearance, it nonetheless feels less sturdy than its elder sibling. There's a tripod mounting point in the base and a major enhancement is the redesigned lens area. This now incorporates a 37mm thread for adding supplementary lenses and filters. The resident lens is rated at f6, equivalent to a 33mm lens on a standard 35mm camera.

At just under 1.1megapixel resolution, it's good for making 5 x 7in prints and more than adequate for the web. We were impressed with its results, too. At all quality settings colours were vibrant and pure and there were clean breaks between light and dark areas – poorly handled JPEG compression can sometimes cause interference in these areas. It also has a lossless compression mode for those with more demanding needs, but at this setting you'll get only four images on the bundled card.

Opting for low compression, 1,152 x 864 images, you'll squeeze around 30 on the same 8MB card and 47 with moderate compression, or 88 if you drop the resolution to 640 x 480. The low compression setting is excellent and, even when zoomed in to 200 per cent, images taken using this mode retain smooth edges with minimal jaggies. The macro mode will take you as close as 15cm and shutter speeds are handled automatically, ranging from 1/4 to 1/500 seconds without the flash or 1/30 to 1/750 with.

The bundled software is HotShots 1.5, which is similar in function and use to Adobe PhotoDeluxe and acts as a front end to Epson's photo uploading software. This is a great improvement over that offered with the 600. It will organise your photo collection, including images from a scanner or disc, and allows you to perform a variety of editing tasks such as cropping and rotating.

Simple drawing tools allow you to make more drastic changes. One tool we particularly liked was the SmartPix offering that allows you to specify the conditions under which the picture was taken – with a flash, under fluorescent lights, and so forth – and it will make compensations for more realistic colours.

We were a little disappointed that the PhotoPC 650 uses a serial interface. This feels slow when you're used to using USB, but the probable audience for this product will be first-time purchasers and, as they say, what you've never had you'll never miss. We can excuse Epson the choice of interface in light of the price, too. The only trouble we encountered with the interface was that it hung while running through a port replication hub. This was solved by plugging it directly into the PC, though.

iMac users, on the other hand, might have more serious problems, for although the PhotoPC 650 is ready for use under MacOS 7.6 and above, the lack of a USB interface means you'll have no way of getting the two to talk.

If you were paying £400, this would be a pretty unremarkable camera, but at less than half that it's a fantastic bargain. Pictures are sharp with vibrant, realistic colours. The bundled software is more than adequate for tweaking your work and the whole package is ideal for the first-time user. If you've been putting off buying a digital camera until the price is right, then you need wait no longer.

NIK RAWLINSON

DETAILS

★★★★★

RECOMMENDED Epson COMPUTER WORLD

PRICE £224.43 (£191 ex VAT)
CONTACT Epson 0800 220 546
www.epson.co.uk
PROS Inexpensive; easy to use; great output
CONS Serial interface
OVERALL At this price you just can't go wrong

PREVIEW

ATi Radeon

With a great mix of performance and features, ATi may have an ace in the graphics card pack.

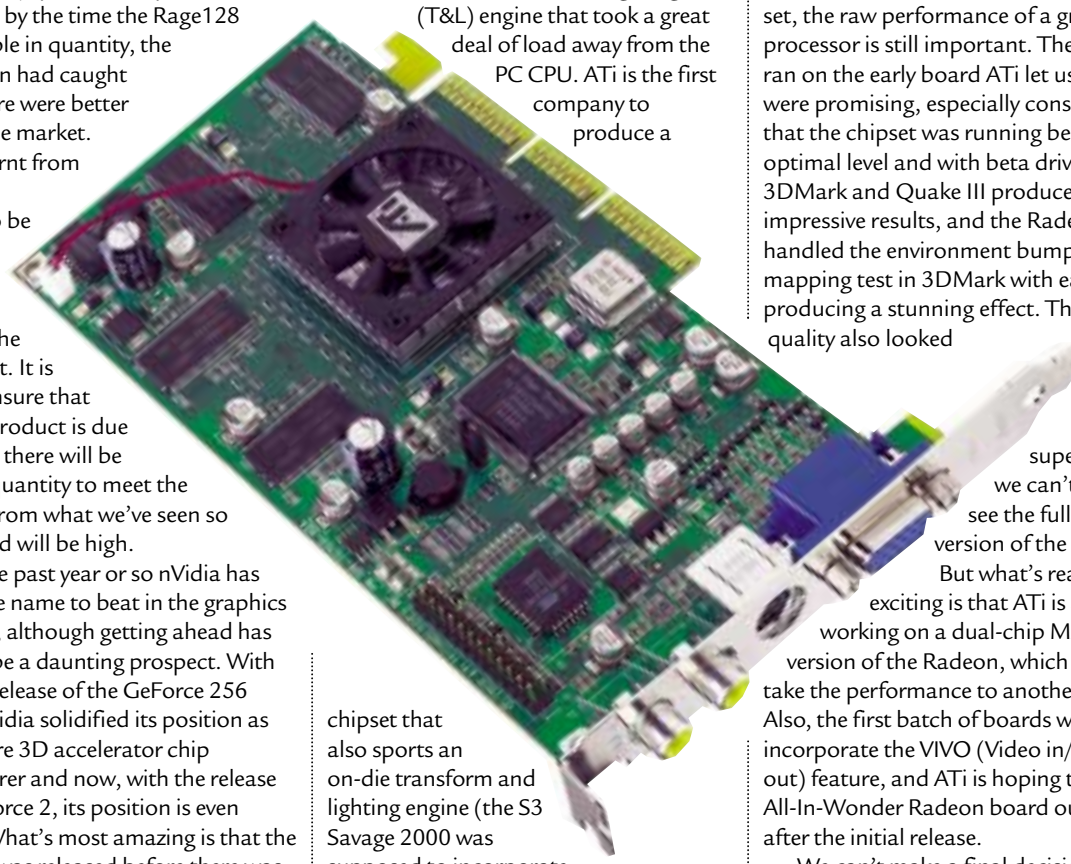
ATi has been rather quiet for some time now. Although the Rage Fury MAXX dual-processor card went down quite well a few months ago, we haven't seen anything revolutionary since the initial Rage128 release almost two years ago. The Rage128 was the first 32MB graphics card as well as being the first to support 32bit colour in a 3D environment. Unfortunately, production problems meant that by the time the Rage128 was available in quantity, the competition had caught up and there were better cards on the market. ATi has learnt from this lesson, deciding to be far more careful with the release of the new chipset. It is trying to ensure that when the product is due for release, there will be sufficient quantity to meet the demand. From what we've seen so far, demand will be high.

Over the past year or so nVidia has become the name to beat in the graphics card arena, although getting ahead has proved to be a daunting prospect. With last year's release of the GeForce 256 chipset, nVidia solidified its position as the premiere 3D accelerator chip manufacturer and now, with the release of the GeForce 2, its position is even stronger. What's most amazing is that the GeForce 2 was released before there was even any competition for the original GeForce chip. But things are about to change with the introduction of ATi's Radeon chip.

The Radeon is ATi's next-generation chipset and it's looking very good indeed. We had access to an early board which wasn't running to full speed, but the results were still impressive. The core clock speed of the CPU will be 200MHz, with the memory also running at 200MHz in SDR format and 400MHz in DDR format. This puts the memory speed well ahead of the GeForce 2 that only manages 333MHz. That said, the card we saw was only running the CPU at 175MHz.

Even though the speed of the processor and the memory looks as though it will be very impressive on the production boards, that's not what makes this new ATi chipset special. Once performance rises above a certain level, it's the feature set that begins to become more important, and thankfully the Radeon looks like it has the most comprehensive feature set yet seen.

What set the original GeForce chipset apart from the competition was the inclusion of a transform and lighting (T&L) engine that took a great deal of load away from the PC CPU. ATi is the first company to produce a chipset that also sports an on-die transform and lighting engine (the S3 Savage 2000 was supposed to incorporate T&L, but it didn't work on the board we reviewed).



However, ATi has not targeted the standard GeForce chipset and instead is going after the GeForce 2. With this in mind, the Radeon sports some very impressive features such as the Pixel Tapestry Architecture. This allows up to three textures to be applied to a single pixel per clock cycle. Multiple textures per pixel is one of the GeForce 2's strongest features, so the fact that the Radeon can match nVidia's latest chip is quite a boon for ATi.

One of the most disappointing aspects of both the GeForce and GeForce 2 chipsets is that they don't support hardware environment bump-mapping, with only Matrox's G400 chipset sporting this feature. This is particularly odd, since it's a standard DirectX feature and the effect from using it is impressive. Thankfully, ATi has learnt from this situation and has added environment bump-mapping to its feature set along with T&L and multiple textures per pixel. This will make the Radeon the most feature-rich chipset available.

Of course, even with a strong feature set, the raw performance of a graphics processor is still important. The tests we ran on the early board ATi let us have were promising, especially considering that the chipset was running below its optimal level and with beta drivers. Both 3DMark and Quake III produced impressive results, and the Radeon handled the environment bump-mapping test in 3DMark with ease, producing a stunning effect. The image quality also looked superb and we can't wait to see the full retail version of the card.

But what's really exciting is that ATi is already working on a dual-chip MAXX version of the Radeon, which should take the performance to another level. Also, the first batch of boards will incorporate the VIVO (Video in/Video out) feature, and ATi is hoping to have an All-In-Wonder Radeon board out shortly after the initial release.

We can't make a final decision on the Radeon until we see the production board, but from what we've seen, ATi has regained its status as a major player in the high-performance graphics market.

RIYAD EMERAN

DETAILS

CONTACT ATi 01628 533 115
www.ati.com
PROS Looks fast and sports the most complete 3D graphics feature set yet seen
CONS None, if the retail version lives up to its promise, but we'll just have to wait for that
OVERALL ATi could be onto a real winner here. As soon as we get the full retail board we'll put it through its paces and make our final judgement

PREVIEW

3dfx Voodoo 5500

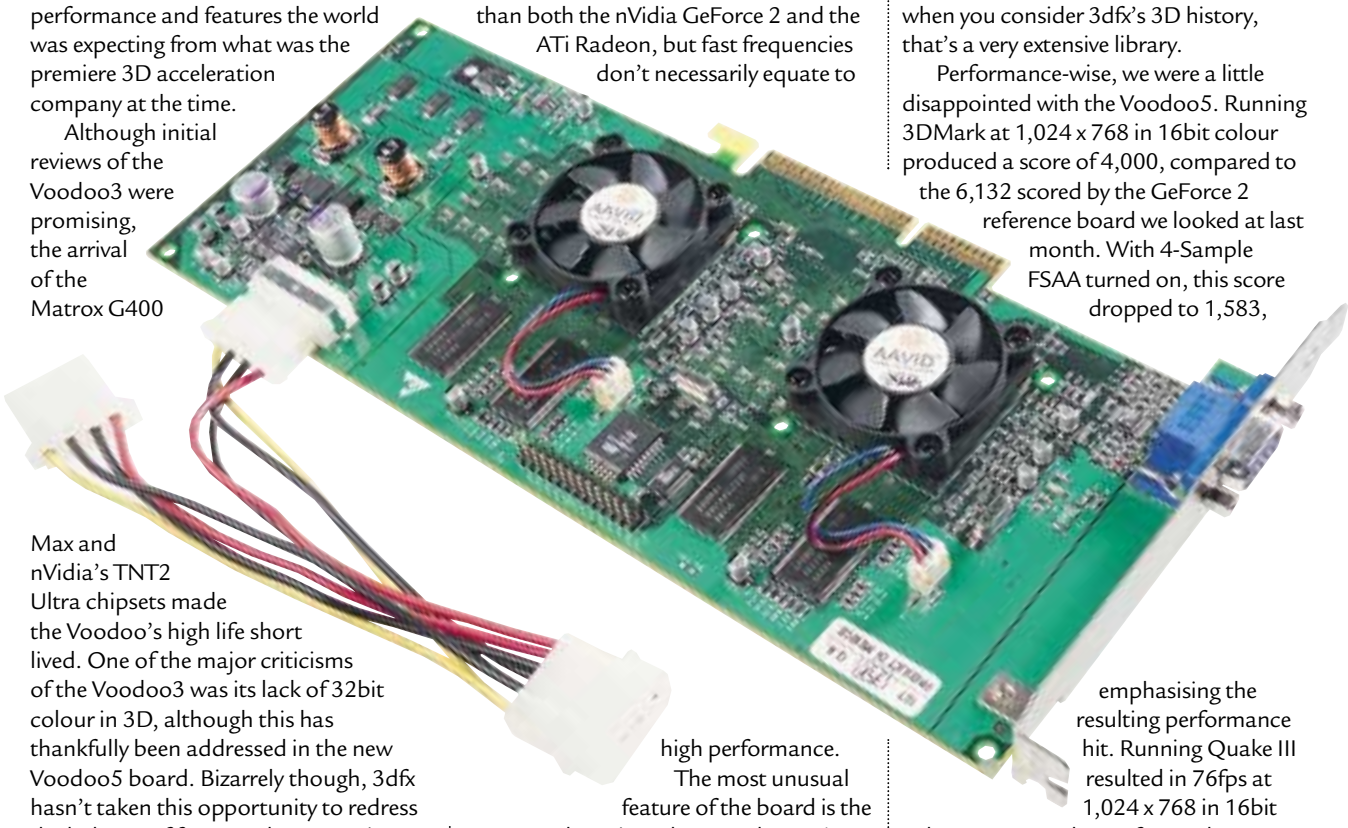
Will the hex of its previous models be lifted when its new production model comes into play?

It seems as though there's a never ending supply of new graphics cards arriving at the moment, with the GeForce 2, the ATi Radeon (see previous review) and now the Voodoo5. 3dfx has had a hard time of late, since its Voodoo3 cards didn't deliver the kind of performance and features the world was expecting from what was the premiere 3D acceleration company at the time.

Although initial reviews of the Voodoo3 were promising, the arrival of the Matrox G400 Max and nVidia's TNT2 Ultra chipsets made the Voodoo's high life short lived. One of the major criticisms of the Voodoo3 was its lack of 32bit colour in 3D, although this has thankfully been addressed in the new Voodoo5 board. Bizarrely though, 3dfx hasn't taken this opportunity to redress the balance of features the way ATi has, choosing to ignore both transform and lighting (T&L) and hardware environment bump mapping.

At the announcement of the Voodoo5 cards at Comdex in Las Vegas last year, 3dfx claimed that the reason for omitting these features was that there is no software support for them yet. This may be generally true, but the fact is that games supporting these features will arrive, and most people would like to buy a card that has at least marginal future proofing.

The first thing you notice about the Voodoo5 is its size. This is a very large card that resembles the full-size ISA cards of yesteryear. Seated on the board are two VSA-100 graphics chips supported by 64MB of SDR SDRAM. 3dfx has used the SLI (Scan Line Interleave) technology that it pioneered with the Voodoo2 cards to get both chips working in harmony. Of course, this time both chips are on the same board rather than on separate ones with an interconnect, and for any of you who are getting ideas about hooking two of these boards together like the Voodoo2, forget it – it won't work. Each VSA-100 chip runs at a core frequency of 166MHz with the memory running at the same speed. This is slower than both the nVidia GeForce 2 and the ATi Radeon, but fast frequencies don't necessarily equate to high performance.



The most unusual feature of the board is the power socket. Since the AGP slot can't supply enough juice for the Voodoo5, it has to be connected to your PC's power supply. This shouldn't cause any problems unless you have a well-stacked system and a small PSU. 3dfx has even been kind enough to supply a power splitter with the board in case you have no plugs free.

3dfx is making a great deal of the full scene anti-aliasing (FSAA) feature of the Voodoo5. Anti-aliasing has been a regular feature in 3D acceleration for some time, used to hide the rough edges produced by the polygons. This feature is one that is generally applied to certain areas of a scene, but with FSAA the entire scene will be anti-aliased, resulting in a much smoother environment. There's no denying that the effect of FSAA is impressive, but the performance hit that results from its implementation is significant. Add to this the fact that the higher the resolution, the less need there is for anti-aliasing. Since most of the next generation of graphics cards can happily play the latest games at 1,280 x 1,024 or above, the benefits are limited. However, unlike T&L and hardware bump mapping that have been waiting for a killer app to take advantage of them, FSAA can be applied to any game, new or old. And when you consider 3dfx's 3D history, that's a very extensive library.

Performance-wise, we were a little disappointed with the Voodoo5. Running 3DMark at 1,024 x 768 in 16bit colour produced a score of 4,000, compared to the 6,132 scored by the GeForce 2 reference board we looked at last month. With 4-Sample FSAA turned on, this score dropped to 1,583, emphasising the resulting performance hit. Running Quake III resulted in 76fps at 1,024 x 768 in 16bit colour, compared to 96fps on the GeForce 2 reference board.

This is still an early board with early drivers, so we'll reserve our judgement until we see the full product next month. The release of the production GeForce 2 boards and what we've seen of the ATi Radeon all add up to some stiff competition for 3dfx. The production board will have to have a serious performance boost to be able to see off the competition in this round.

RIYAD EMERAN

DETAILS

CONTACT 3dfx **www.3dfx.com**

PROS FSAA can be applied to any game, to matter how old

CONS No T&L and uninspiring performance

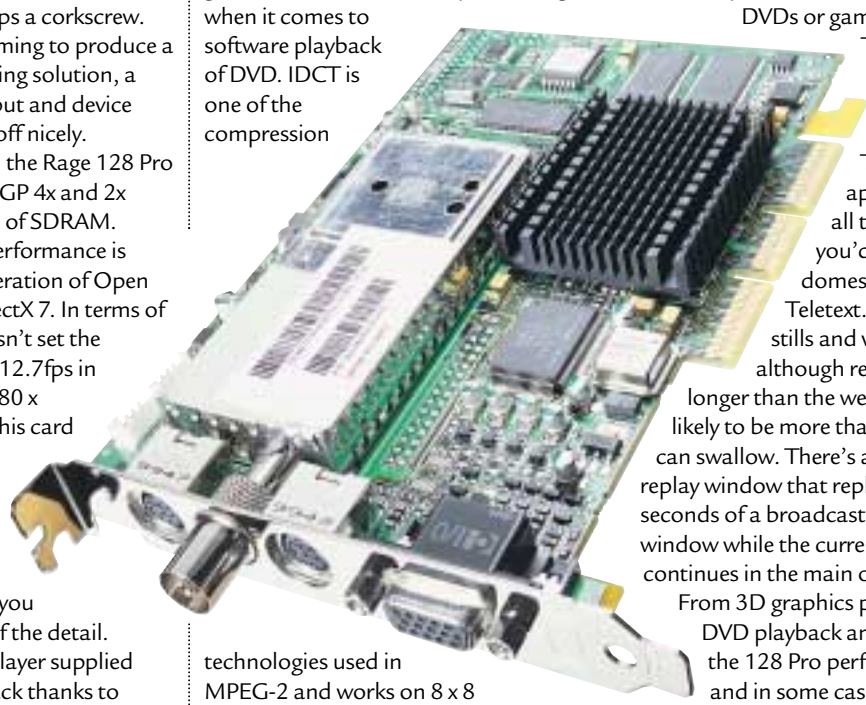
OVERALL We expected lightning-fast performance from this card, but we didn't see it. Hopefully the production model will put 3dfx back in the running

ATi All-In-Wonder 128 Pro

A card for all occasions, but particularly if you want to edit video from an analog source.

ATi's All-in-Wonder Pro is the Swiss army knife of graphics cards. Combining 3D graphics acceleration, DVD playback, still and motion video capture, a Teletext TV tuner and digital VCR, it's hard to think of anything else that ATi could have included – except perhaps a corkscrew. Although, if ATi were aiming to produce a truly versatile video-editing solution, a FireWire port for DV input and device control would round it off nicely.

The card is based on the Rage 128 Pro chipset, which is both AGP 4x and 2x compatible, with 32MB of SDRAM. Improved 3D gaming performance is provided through acceleration of Open GL and support for DirectX 7. In terms of 3D performance, it doesn't set the world alight, managing 12.7fps in our Quake III test at 1,280 x 1,024 in 32bit colour. This card is not supposed to be about blistering 3D performance, though, but it is good to know that it should be able to play new games, even if you have to sacrifice some of the detail.



The software DVD player supplied achieves flawless playback thanks to support from the Rage 128 Pro chip that takes on most of the decoding work from the CPU. Video capture, editing and output is supported by the new Rage Theater chip that samples analog video and compresses it on the fly to a number of digital video standards. The TV tuner software allows you to compile personal TV schedules, capture TV clips to your hard drive, and view instant replays in a separate window.

All the card's functions are accessed from ATi's Multimedia Centre software – a floating, tabbed palette that can be docked to the screen edge. This provides access to the display settings, DVD player, the video editor, TV tuner and CD player.

The performance of the software DVD player is difficult, if not impossible, to distinguish from a hardware player and this is testimony to the efficiency of the Rage 128 Pro in offloading a large part of the processing overhead from the CPU. Decoding MPEG-2 (the format used for DVD) video involves a number of steps including parsing, variable length decoding, inverse quantisation, Inverse Discrete Cosine Transform (IDCT), motion compensation and sub-picture decoding. Finally the image data is converted from the native YUV to the PC-friendly RGB format.

Like other graphics cards, the Rage Pro 128 handles several of these functions, but it's the IDCT function that gives the ATi card the competitive edge when it comes to software playback of DVD. IDCT is one of the compression technologies used in MPEG-2 and works on 8 x 8 pixel blocks of keyframes in the video stream. At 720 x 576 (PAL) resolution there are more than 5,000 of these 'macroblocks' to be decoded for each keyframe and removing this task from the CPU makes possible software DVD playback with none of the jitter and dropped frames you might see in the absence of dedicated hardware.

Everything you need to capture, edit view and export video is included. The card has video in and out ports and a small breakout box with phono inputs and an S-Video connector is supplied.

Supported capture formats include uncompressed YUV (although at 10Mbytes/sec you'll need a fast hard drive to keep up), MPEG-1 and MPEG-2. Video capture is done using Ulead's Video Studio 4, which is an excellent entry-level video-editing application. ATi claims the Rage Theater chip makes possible capture of video in any of the supported formats with superior compression to the competition. Performance in any case will be limited by the hard drive and processor capabilities of individual systems. We achieved excellent results with capture and playback from a video source connected to the S-Video port of the breakout box.

For recording video back to a VCR, S-Video and composite video output are available. As well as recording video projects to tape you can make use of these for pure entertainment – watching DVDs or gaming on a domestic TV at resolutions up to 800 x 600. Not that you really need a TV. The ATi TV viewer application provides all the functionality you'd expect from a domestic set, including Teletext. You can capture stills and video clips to disc, although recording anything longer than the weather forecast is likely to be more than your hard drive can swallow. There's also a neat instant replay window that replays the last few seconds of a broadcast in a separate window while the current action continues in the main one.

From 3D graphics performance to DVD playback and video capture, the 128 Pro performs as well as, and in some cases better than many single-function boards.

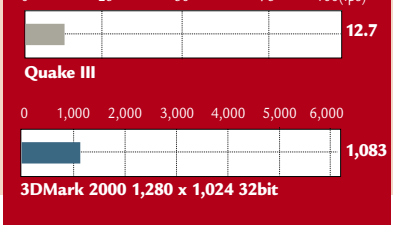
KEN MCMAHON

DETAILS

★★★★

PRICE £149 (£126.80 ex VAT)
CONTACT ATi 01628 533 115
www.ati.com
PROS Flawless DVD playback in software; excellent analog video capture features
CONS No IEEE1394/FireWire port
OVERALL Given the rise of digital video it's unlikely that its analog video input alone will be much of an attraction for very long, but it's nonetheless a good option if you want to edit video from a variety of analog sources, or are looking for good all-round performance and comprehensive multimedia features

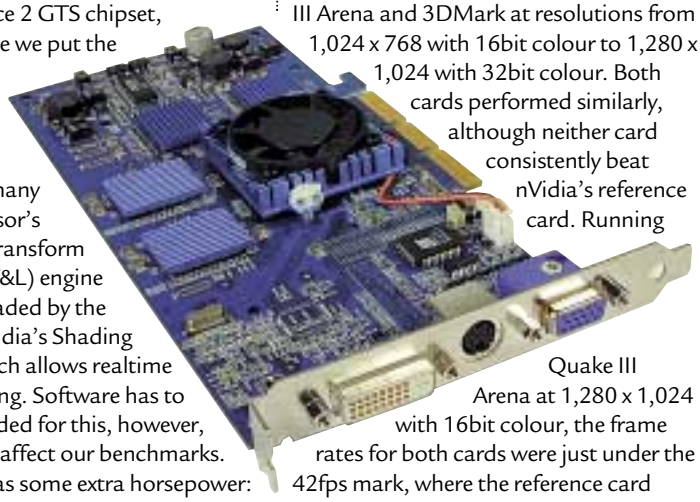
PERFORMANCE RESULTS



Hercules 3D Prophet II vs Asus V7700

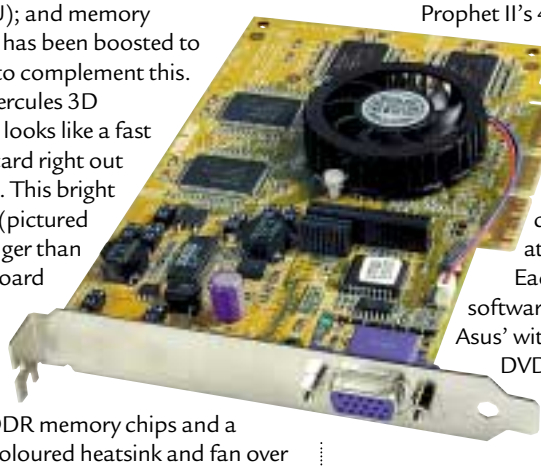
The first two graphics cards to take advantage of the GeForce 2 GTS chipset go head to head.

Last month we previewed nVidia's reference board for the new GeForce 2 GTS chipset, and in this issue we put the first two retail boards head to head. The GeForce 2 has improved on many of its predecessor's features. The transform and lighting (T&L) engine has been upgraded by the addition of nVidia's Shading Rasterizer, which allows realtime per-pixel shading. Software has to be specially coded for this, however, so this did not affect our benchmarks.



The card has some extra horsepower: the core clock speed has been increased to 200MHz, enhancing the performance of the GeForce 2's Graphics Processing Unit (GPU); and memory frequency has been boosted to 333MHz to complement this.

The Hercules 3D Prophet II looks like a fast graphics card right out of the box. This bright blue card (pictured top) is longer than nVidia's board and has electric blue heatsinks over the DDR memory chips and a similarly coloured heatsink and fan over the GPU. It also has sockets for both S-Video and DVI.



The yellow Asus V7700 (pictured above) is smaller than the 3D Prophet II and doesn't have its immediate visual appeal. Having said that, the Asus has a rather novel, round heatsink and fan over the GPU. In contrast to the 3D Prophet II, the memory chips on the Asus board look positively naked. The version we reviewed came with just one D-SUB port – sufficient for the majority of users, and it helps to keep the price down.

The stylish look of the Hercules heatsinks, though, is less relevant than their cooling function. Their presence on the 3D Prophet II should ensure that this card would be more stable should you choose to overclock the memory.

We tested the cards using both Quake III Arena and 3DMark at resolutions from 1,024 x 768 with 16bit colour to 1,280 x 1,024 with 32bit colour. Both cards performed similarly, although neither card consistently beat nVidia's reference card. Running Quake III Arena at 1,280 x 1,024 with 16bit colour, the frame rates for both cards were just under the 42fps mark, where the reference card achieved just over 42fps. At 1,024 x 768 with 32bit colour the Asus came out top with a 3DMark of 4,618 compared to the Prophet II's 4,455 and the reference card's 4,559. In real terms the difference in the figures isn't that relevant as both cards are performing at such a high level. Each comes with a software DVD player – Asus' with its own DVD2000, and the Hercules with the latest version of Power DVD. With a fast enough processor, these should allow you to watch DVD movies with no dropped frames.

Both cards come with drivers for Windows 95, 98, NT4 and 2000. Hercules won't support the NT4 and 2000 drivers it ships, however, but they are provided to use at your own risk.

The main difference is one of price. The Hercules card retails at £340 inc VAT, while the Asus comes in at a shade under £300. There are a few extra features on the Hercules: DVI and S-Video outputs, as well as heatsinks on the memory for overclockers. However, the overall performance difference is nominal.

So if you need the extras and have the cash, the Hercules is the desired card. But if you don't need the DVI or S-Video connectors and want a new graphics card purely for game playing, then the Asus V7700 is the card for you.

SCOTT MONTGOMERY

DETAILS

HERCULES 3D PROPHET II GTS

★★★★★

PRICE £339.57 (£289 ex VAT)
CONTACT SMC Direct 01753 550 333
www.hercules.com
PROS Heatsinks on memory chips; DVI and S-Video
CONS More expensive
OVERALL If you want to overclock your GeForce 2 then the presence of heatsinks on the memory of the Prophet II are likely to make this the card to buy

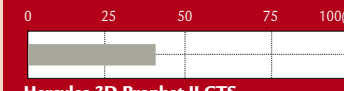
ASUS V7700

★★★★★

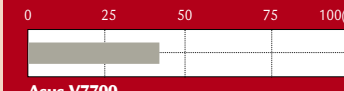
PRICE £297.30 (£253 ex VAT)
CONTACT SMC Direct 01753 550 333 **www.asus.com**
PROS Cheaper
CONS No heatsinks on the memory chips
OVERALL Although still pricey, this card is cheaper than the Prophet II and would also be an excellent choice for those who don't need the extra outputs

PERFORMANCE RESULTS

Quake III 1,280 x 1,024 32bit colour & textures

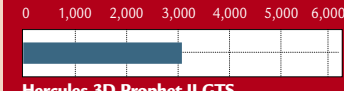


Hercules 3D Prophet II GTS

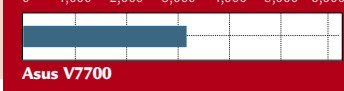


Asus V7700

3DMark 2000 1,280 x 1,024 32bit colour



Hercules 3D Prophet II GTS



Asus V7700

Dragon Mobile Organiser

If you're into training inanimate objects and updating information on the move chase the Dragon.

Personal organisers are one of the must-have accessories for the busy executive, but even if you carry a Psion or a Palm around with you, using the keyboard or handwriting input just isn't always convenient, no matter how proficient you are. Enter the Dragon. Its Naturally Speaking Mobile Organiser is, effectively, a small digital dictation machine. It's compact, fairly simple to use, and out of the box can store around 40 minutes of speech.

What makes it a mobile organiser rather than just a dictation machine is the link to the PC. On the bottom of the unit is what, at first glance, seems to be a USB port. In fact, it's a standard serial link, using a USB plug – how's that for confusion? You can, incidentally, use the handheld as a microphone on your PC, and the package includes a headset, that will work either with the handheld, or if you want to talk directly to the PC via your sound card.

At the software end of things, there's a copy of Dragon's NaturallySpeaking voice-recognition package, along with Mobile Organiser. Installation pops both of these on your hard disk, but you'll need over 200MB spare. During the installation you also have to train the recognition system. That's done by picking a text from a supplied range and reading it into the dictation unit. Thankfully you can press the pause button and then come back to it – even reading at a fairly fast rate, the sample text we used took around 25 minutes to complete. After that, you need to connect the cable and wait while the PC first transfers the file and then learns the nuances of your pronunciation. This process can take as long as an hour on the specified 200MHz Pentium, and rather longer on anything slower. Remember, too, that even if you've trained a PC with your voice already, you need to do it again, to take into account the microphone characteristics of the recorder. That done, you have a choice of organisers with which the program will work, including Palm Desktop, Outlook, Goldmine, and ACT.

Using the organiser is pretty simple, though if you're not used to computer-based dictation, you might need a while to get used to things like remembering to put in full stops and other punctuation. And you need to define the key words, such as 'remind' that help the system decide what type of entry to make in your organiser.

When you've created the notes you want (which can be saved in different folders on the handheld, then you can select which ones you want to transfer) you just plug the unit into the PC and select 'Get items.' As each file is transferred, it's recognised on the fly, and the software presents a list of what it thinks you want it to create.

Even after the mammoth training session, you'll find that there are errors when you first start to use the system, but the software allows you to correct these, and will improve the recognition as you do. You can change just about every aspect of the items that have been created; it can be discouraging at first, when simple things like a one-line appointment have a few mistakes in them, but perseverance pays, especially if you want to dictate longer items, such as emails, that can be very tedious to create on some pocket-sized devices.

Correcting items on a slower PC can be a little tedious, however, as the system doesn't seem that responsive, probably because the speech database is updated as you enter your changes. Fix any problems, click to OK an item, and when you're done, a simple click on the 'Send' button updates your organiser.

However, it's still not all plain sailing. You can't, for instance, dictate information directly into specific fields in an address book. Instead, information will end up as a text note, so you can cut and paste. And in the time we had to play with the system, we still couldn't manage to get it to properly write an email address.

Those niggles aside, this is certainly a system that works, and the faster your computer, the more useful you'll find it. For those who want to update information on the move, it's a great idea – provided you're prepared to put the time into training it initially.

NIGEL WHITFIELD

DETAILS

★★★

PRICE £249 (£211.91 ex VAT)
CONTACT Dragon Systems 01628 894150
www.dragonsystems.com
PROS An efficient way to enter information into your organiser from a compact unit
CONS Lengthy training; not 100 per cent integrated into the organiser software
OVERALL A convenient and mostly accurate way of updating contacts and appointments when you're on the road, but it needs training before use, and you'll need to fiddle with some data even when it's been transmitted to your PIM software

InFocus LP335

If you want to improve your image take a closer look.

The latest micro-projector from InFocus may look like it costs a lot of money, but it's a fantastic unit. It utilises the latest DLP chip from Texas Instruments and this, combined with advances in lamp technology, has enabled the company to bring the image up to a massive 1,000 lumens. This means that pictures it produces can be viewed even with the lights on, and the huge 1,024 x 768 resolution results in an extremely sharp, crisp image. Despite this, it weighs only 2.21kg.

It has every port that you'll ever need – InFocus has shunned yesterday's technology in favour of a DVI connector. Don't worry if you don't have this connector on your graphics card or notebook, however. As standard, the projector ships with a DVI connector that splits into a single D-SUB and USB mouse connector, ensuring that this unit will work with the majority of today's devices. There are also audio in, composite in and S-Video in ports. There's a built-in speaker that works well enough, although it isn't intended to be of sufficient quality to play your movies on. It will suffice for PowerPoint effects, though. A manual zoom control is located next to the lens, and you can adjust the focus by turning the lens. There's an infra-red receiver on the front of the projector, and this responds to signals sent through the excellent remote control. A circular pressure-sensitive control enables you to move the mouse and a trigger underneath the control acts as the left mouse button. You can also access the projector's menu and change input sources from here.

The menu system is extremely easy to navigate and allows you to alter the picture to your taste. It includes the all-important keystone correction, and gives you the opportunity to leave the image refinement to the projector or take control yourself. InFocus is aiming this at mobile presenters and rich home cinema enthusiasts alike, and the tests we did with both a notebook and standalone consumer DVD player confirmed that it performs magnificently in both scenarios. It is a huge amount of money, admittedly, but if you need something this small and light then look no further than the LP335.

JASON JENKINS

DETAILS

★★★★★

PRICE £4,876.23 (£4,150 ex VAT)
CONTACT InFocus 0800 028 6470
www.infocus.com
PROS Small; light; excellent bright image; easy to use
CONS High cost
OVERALL If you afford it, buy it

Iomega Clik! Dock

A tiny PC Card slot – but unfortunately it's restricted to those who have Click! Drives.

Essentially a PC Card slot in a smart blue box slightly larger than a pack of cigarettes, Clik! Dock connects via a slightly short USB cable and draws power from the mains rather than the PC. Installation was somewhat tricky, with Iomega recommending the uninstallation of existing Iomega software driving a USB ZipCD and parallel Zip 250. These still worked fine after the installation of the Clik! Dock but the whole process caused several crashes, each of which required a reboot.

You don't get a bundled drive, but then you couldn't expect that at this price. What disappointed us, though, was that Iomega states plainly that it will not work with any PC Card other than a Clik! Drive. We put this to the test with a Memory Stick reader from Sony and, sure enough, the drive disappeared from My Computer. Further evidence, if it was needed, came from System Properties. The reader appeared as a USB device rather than as a PC Card slot as they do on notebooks. We think this is a little shortsighted – making it a general PC Card reader would increase the appeal and if that's what you're after then you can pick one up from www.laptopshop.co.uk for £79 ex VAT.

That said, it performed well, copying a 7MB directory of mixed files from a hard drive in just 21 seconds, although it continued writing for a further 16 seconds, during which ejecting the disk would be unwise. Again, we put this to the test and invoked a series of unrecoverable blue screens, eventually resorting to a reboot.

If you have a PC Card Clik! Drive there is no doubting this is a sensible investment – it's just a shame you can't use it with other PC Cards.

NIK RAWLINSON

DETAILS

★★★

PRICE £34.99 (£29.78 ex VAT)
CONTACT Iomega 0500 973 194
www.iomega.com
PROS Quick and convenient
CONS Flaky installation on our test machine; restricted to use with Iomega Clik! Drives
OVERALL Does what it says on the box, but could have been so much better

Lexmark Z52

A quality, budget printer that may drive you mad when it tells you it's out of paper.

A talking printer may seem like a strange invention, but unfortunately the most exciting thing Lexmark's latest model says is 'replace paper'. It's a handy feature if the unit is situated at the far end of a room, but by the time we'd finished testing, it had turned from cute to annoying.

Luckily, there are a lot of other things to recommend this top-quality, but reasonably priced unit. For a start, it's the first printer we've seen boasting a resolution of 2,400 x 1,200dpi on all paper types. Image quality is good with little evidence of banding or fading. Even photos were reproduced reasonably faithfully, although we couldn't agree with Lexmark that they were virtually dotless on photo paper.

Lexmark promises some impressive print speeds –15 mono pages a minute in draft mode and seven in colour. Although our test print documents generally contain a higher concentration of text and images than the manufacturer's own, the Z52 fell a little short. It could only muster almost eight mono pages in draft mode and five in normal mode. That is still more than fast enough for most home users, though, and using the built-in 100-sheet feeder you won't have to hold it by the hand throughout.

The printer boasts parallel and USB connections, so regardless of whether your PC is completely up to date or full of legacy parts, you'll be able to connect this straight away. Installation is a breeze and the driver software is some of the best we've seen. There's even a shrewd marketing button that takes you direct to Lexmark's website to order more ink.

In the looks department the printer is fairly unspectacular, with a boxy appearance and a reasonably large footprint, but for the price we've few complaints.

RICHARD MCPARTLAND

DETAILS
★★★★

PRICE £139 (£118.29 ex VAT)
CONTACT Lexmark 01628 481 500
www.lexmark.co.uk
PROS Good maximum resolution; excellent driver software; good price
CONS Reasonably large and boxy; print speeds didn't stand up to Lexmark's claims
OVERALL A good budget performer capable of producing fairly high-quality prints

Mustek BearPaw 1200

A stylish flatbed scanner but for the money it underperforms on many fronts.

This flatbed scanner offers a true optical resolution of 600 x 1,200dpi, at a colour depth of 42bits. It's a sturdy scanner with blue see-through flanks and a fascia that sports five buttons arranged in the style of a paw print – hence the name. These should allow you to scan, copy, fax or email, but during testing we had a few problems. Pressing any of the buttons resulted in a program error, and at the time of writing no driver update was available.

The bundled PhotoExpress 3.0 SE presented no problems, provided the image was acquired within the software. Installation was simply a case of plugging the captive USB cable into our PC and going through the standard detection process. The Bearpaw's captive cable may help to keep the price down, but means if a fault develops, you'll have to return the entire unit for repair.

We tested the scanner using the driver's default setting of 600dpi and a 24bit colour depth. Unfortunately, the test results left a lot to be desired. Our test target was reproduced with a red tint, with the white background suffering most visibly. There was also clear evidence of banding, with the image suffering from an uneven luminence. The Bearpaw was better at reproducing colours, although it struggled to recreate light green. Text was reproduced adequately, although we have seen better results elsewhere. When it came to reproducing our Modulation Transfer Function (MTF) patterns (closely drawn lines that test the true resolution of the unit), there was still huge room for improvement.

TextBridge Classic 2.0, for Optical Character Recognition, and Trellix Web, for those who want a simple website creation tool, are included.

Mustek's scanner does a basic job and looks stylish. However, for the money, it under-performs.

JALAL WERFALLI

DETAILS
★★

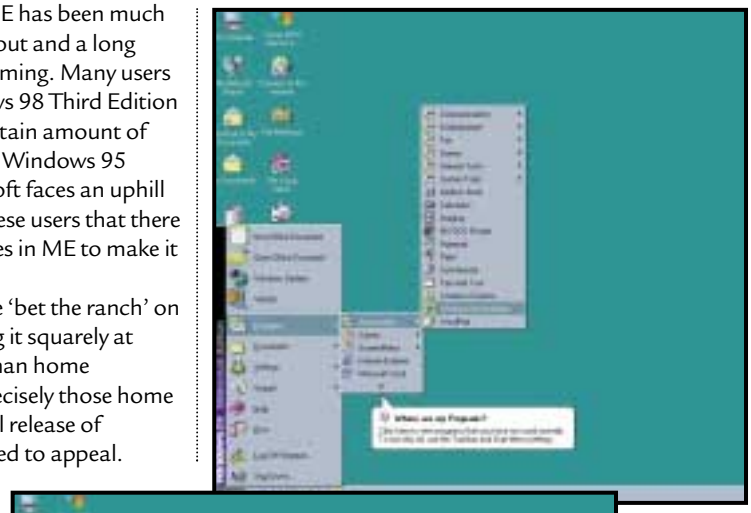
PRICE £111.62 (£95 ex VAT)
CONTACT evesham.com 0800 0353 353
www.mustek-europe.com
PROS Sturdy surround and styling
CONS High price; buggy driver; test results could be better
OVERALL Overpriced and not the best, but image-conscious users might be interested

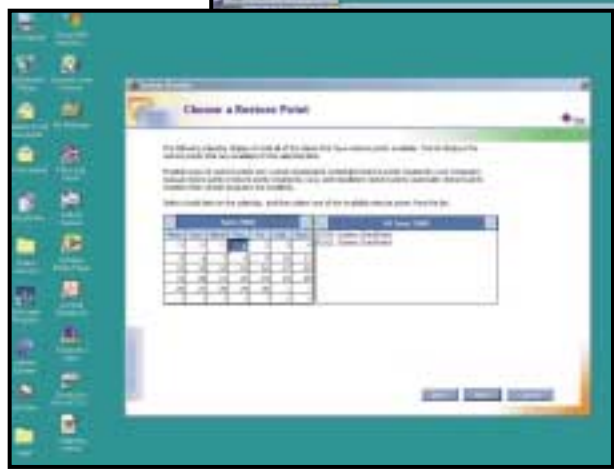
Windows ME Beta 3

Microsoft gets creative with Windows Millennium Edition as its latest project nears completion.

Windows ME has been much talked about and a long time in coming. Many users are billing it as Windows 98 Third Edition while others, with a certain amount of cynicism, claim it to be Windows 95 Service Pack 5. Microsoft faces an uphill struggle to convince these users that there are enough new features in ME to make it worth their while.

Microsoft may have 'bet the ranch' on Windows 2000, aiming it squarely at business users rather than home consumers, but it is precisely those home users to whom the final release of Windows ME is expected to appeal.





The latest incarnation of the OS retains the familiar Windows 9x interface (left). In the event of a mistake System Restore can retrieve the system's last known configuration (bottom)

If you were hoping to see a radical user interface overhaul, you'll be disappointed. Like it or loathe it, the Windows 9x interface is by now familiar to us all and it is this familiarity that is one of the OS' primary strengths. However, the engineers in Redmond have had their leads slackened and their creativity shines through in some areas, not least in the new media player.

Windows ME is very entertainment centric, so it's not surprising that this key applet has grown in importance. Used for playing back not only CDs but also Internet content, it will quickly become a familiar part of your OS. However, to save things from becoming stale, Microsoft allows you to change the whole look and even shape of the Media Player interface by using a variety of skins, perhaps inspired by the likes of the Sonique MP3 player. More important than the look, however, is the functionality, and here Millennium lets you build an entire music library on your hard drive. Media Player includes the option to rip tracks to Windows Media Format (WMF), which comes out smaller than the average MP3 variant of an identical track yet retains compatibility with many solid-state players. Drive space permitting, Media Player means you could have a copy of your entire CD collection on your work PC while leaving your valuable discs at home.

The fact that Microsoft sees media as an important factor is backed up by the inclusion of Movie Maker, an easy-to-use application for organising your media, whether they be photos, movie clips or sound, and building them into a presentation. It's like a stripped down version of the software that ships with Pinnacle's video-capture cards and, although by no means as complex, should be more than adequate for piecing together snippets of shaky holiday videos into a single cohesive production. It's not a fiddly operation, either. Your media assets appear in a library and you then merely drag them onto the timeline. Hit Play and you're done.

Microsoft may have come off worst in its scrap with the US Department of Justice, but that hasn't stopped the bundling of Internet Explorer 5.5, and neither should it – Windows was not the first OS to ship sharing its installation CDs with a browser. As became evident in our full review of the IE5.5 beta in the July 2000 issue, there are far-reaching changes under the hood but they are at the mercy of web designers. To be put to use they must be called from pages and, with web developers notoriously nervous when it comes to implementing new features, it's likely their use will depend on there being an installation base of sufficient size to make accessibility concerns a no brainer.

There is no DOS in Windows Millennium. You can still access a command line through a Window but you can't boot to the familiar C prompt. This is a move that sees Scandisk shift into Windows mode, even after an improper shutdown. The familiar contents of the autoexec.bat and config.sys files have been moved into the Windows system. Microsoft claims this will make the OS start faster and we must admit that in our tests we did seem to spend less time sitting around waiting for things to happen, although whether this is just because it was a fresh installation is difficult to say.

Some aspects of Windows 2000 have made it into this consumer package. Menus will personalise, including the start menu, to include only those applications you regularly use. This is a love or hate feature so if you fall into the latter category you'll be glad to hear it can be disabled. The Start menu can be further customised from the Settings menu – you can specify precisely what should appear, so if you never use the Recent Documents list you can make it disappear and perhaps replace it with the contents of your Favourites folder.

If you have a DEL-key disaster all is not lost. Millennium benefits from inbuilt System Restore utilities. Working along similar lines to the commercially available Second Chance and GoBack software this takes snapshots of the system status, allowing you to restore the last known working configuration should you delete a vital application file, or perhaps more likely, install some unfriendly software.

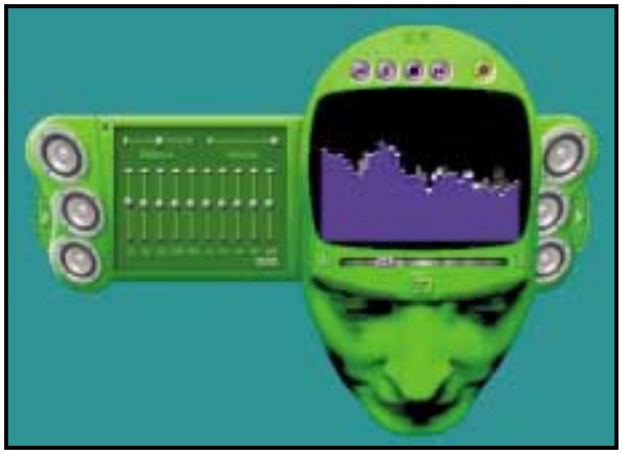
BETA

System File Protection has now been introduced. We've all experienced the damage that can be done when a rogue installation overwrites a core DLL or other file crucial to running Windows. This new feature sits quietly in the background watching everything that goes on and repairing any such damage. In theory it should mean that you can install and uninstall third-party applications without a second thought, but there are times when an updated DLL has been included with your new application and Microsoft must ensure that its system is graceful enough to recognise when the core Windows files are outdated and in need of replacement.

The Printers folder has been supplemented by a new Scanners and Cameras folder. This has been a long time coming and is one of those features you probably never knew you were missing until now. It keeps you just a couple of clicks away from what are fast becoming two of the most popular peripherals going, which in this age when seemingly everyone is furnishing their own corner of cyberspace is a welcome move.

Microsoft has recognised that more and more families are now living in two-PC households. More often than not, when you buy a new computer you hang on to your old machine for the kids or parents (delete as appropriate). The trouble is that running two machines inevitably means fighting for access to the Internet. After all, with only one phone line coming into most homes you can't have more than one PC online at a time. With this in mind, Millennium makes it easier to network your machines, using the Home Networking Wizard. This will take you step by step through assigning computer and group names and specifying which parts of your drives you are willing to share with other computers on the same network.

If you have neither the means nor the inclination to physically connect the PCs – perhaps they are on separate sites – you can still put Millennium to good use. There's a fair chance, for example, that you'll want to collect your POP3 mail through your client at work. In the past doing this meant entering all of your POP3 and outgoing server settings twice, once on the PC at home and once again at work, but the new duplicate function will copy all your Internet Explorer and Outlook Express settings to a floppy, ready for importing directly into the same applications on the second machine. Not only is this easier than remembering the entries yourself, but it's also quicker than having to manually re-enter the variables.



ME's Media Player allows you to change the look and shape of its interface with a range of different skins

Should you need to delve into the workings of Windows Millennium, the Control Panel has been made far more user friendly. Opening it presents just the most commonly used components, which is great for first timers who may be baffled when faced with the full might of the standard Panel contents. More experienced users can make use of a hyperlink to display all functions.

The Windows help system has been dramatically improved. This is now visually far more appealing and has a distinctive web feel to it. There are links to articles on Microsoft's website, which in theory should mean that you are always accessing the most up-to-date information. It includes a range of tours, which will be a welcome feature if the manual follows similar lines to those boxed up with Microsoft's other revisions of the OS in recent years. These have been slim, to say the least.

Perhaps the biggest problem Microsoft has on its hands is the fact that many of the pertinent features of Windows ME have been available for some time to users of Windows 98. The Media Player, albeit a beta, is available for download from Microsoft's website and there is a good chance that if you have the hardware necessary for capturing moving video you'll also have enough in the way of software to make Movie Maker pretty much redundant. Internet Explorer 5.5 too, has been available to download for some time. With so much recycled content, Windows Millennium is starting to look more like an impressive bundle of all the upgrades you have not yet got around to installing and, as some of these components can be found on magazine cover discs, you have to ask yourself whether you'll make enough use of those that are not to be worth the cost.

For Windows 95 users the answer to that question is a resounding 'yes', but if you're happily running with a stable installation of 98SE then perhaps you'll have to think more carefully. There is no denying that many of ME's features are welcome advances but many are overdue and a lot of users have already found alternatives rather than wait.

NIK RAWLINSON

DETAILS

★★★

CONTACT Microsoft 0345 00 2000
www.microsoft.com

PROS Familiar, some neat enhancements

CONS Much of the content of ME is already available elsewhere

OVERALL Undoubtedly a worthy upgrade from Windows 95, but if you're currently running Windows 98SE the decision might not be so clear cut. We've only given it three stars, here, but if the price is right that could improve in the final review

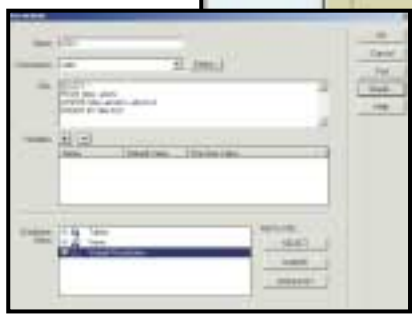
Dreamweaver UltraDev

Macromedia is taking the dynamic route with UltraDev's ability to access live data.

Dreamweaver is the tool of choice for many web professionals, thanks to its unusual combination of strong visual design tools and high-quality generated code. It is also highly extensible, both through custom scripts and by writing your own C-level functions. Dreamweaver defuses the usual debate about visual tools versus text-based coding by bundling a strong HTML editor with the product: Homesite for Windows, or BBEdit on the Macintosh.

Accessing live data has until now been a gap in Dreamweaver's feature list. This has not caused much upset, as you could always add your own scripts to Dreamweaver pages, and generally the editor would assume you knew what you were doing and leave the code alone. This only helps if you have the time and inclination to code your own server-side scripts for database access or other dynamic content. Dreamweaver UltraDev now brings this within reach of ordinary users, by providing integrated RAD tools. In other respects this is still Dreamweaver 3, so you can think of it as a deluxe edition of the standard item.

UltraDev now adds dynamic data to Dreamweaver's impressive feature roster



Use this dialog to define an UltraDev recordset. You will need to know SQL for more than basic usage

Not long ago, Macromedia released Drumbeat, which it acquired by taking over Elemental Software. Drumbeat provided exactly the kind of dynamic content that Dreamweaver lacked. Clearly, Macromedia needed to integrate the two products, and integration in this case means ditching Drumbeat and upgrading Dreamweaver. Some Drumbeat users are most unhappy about this, particularly since Drumbeat does not work properly on Windows 2000. In addition, some features of Drumbeat, such as the ecommerce edition, are not part of UltraDev. On the other hand, most people would rather work with an improved Dreamweaver than have to learn a different product. Whatever, Drumbeat is dead and UltraDev is now what you get.

Here is how it works. When you define a new website in Dreamweaver UltraDev, there is a new set of properties called App Server Info. Here you can choose a server model. The choices are Active Server Pages 2.0 (ASP), Java Server Pages 1.0 (JSP), or Cold Fusion 4.0. All three refer to ways of interpreting scripts on the server, before sending HTML to the browser. Sadly, PHP, an emerging open-source alternative to these three systems, is not included.

Note that Dreamweaver UltraDev on its own does not supply any of these server-side technologies. Instead, they are separate third-party products that must be installed on your chosen web server. ASP is widely available, since it is a free add-on for Microsoft's Internet Information Server and Personal Web Server, part of Windows NT/2000 and Windows 95/98 respectively. Java Server Pages are supported by Sun's Java web server, or by installing Allaire's JRun add-on. Cold Fusion is also an Allaire product. Not all ISPs support these products and very few of the basic dial-up accounts provide such services, so if you want to use UltraDev on the Internet, have a discussion with your ISP first.

Once the site is defined, you design pages in the usual Dreamweaver manner, but with some additional resources. These are obtained from a tabbed window offering Data Bindings and Server Behaviors. The Data Bindings tab lets you define data connections such as recordsets and stored procedures. There is also access to server-side content such as the HTTP Request header, which includes information such as which browser is being used. The type of data connection available depends on the server model you are using. ASP uses Active Data Objects (ADO), JSP uses JDBC, and Cold Fusion supports both. If you are running Windows, ODBC is always available. For ASP, you can also specify VBScript or JavaScript for server-side scripting. When you define a recordset, there are limited visual tools or you can type in an SQL query.

The next step is to add dynamic content. For example, you might have a website where you want to display a name and an image from a database on each page. To do this, type some text on the page as a placeholder and select it. Then find the Name field in the appropriate recordset in the Data Bindings window and drag it to the page. At runtime, the placeholder text will be replaced by the value of the field. You can do the same with an image, provided the database contains not the image, but a path name accessible to the web server. A live data option lets you retrieve values at design-time, provided that a web server is online.

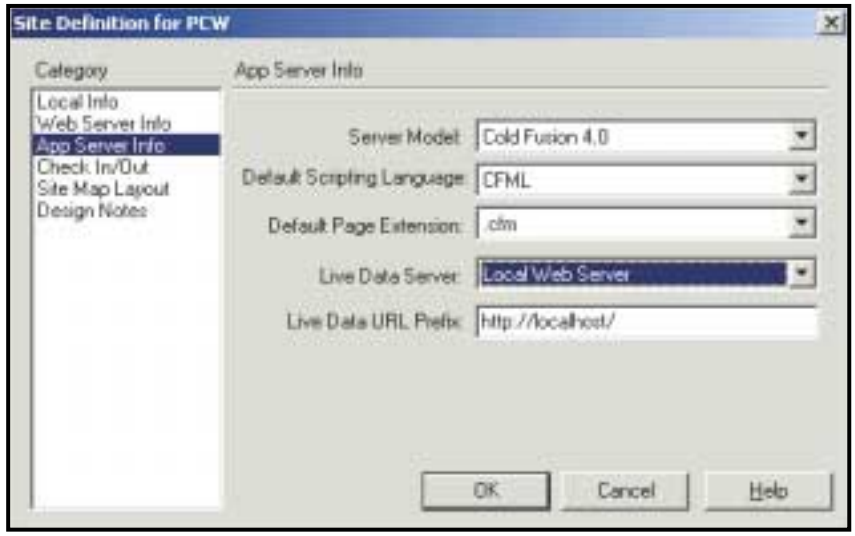
After defining dynamic content, you will want to add functionality such as navigation controls, search facilities and, possibly, insert and update commands. These features are provided by the Server Behaviors window. Standard database functions are listed, along with ways to show more than one record on a page through lists or repeated regions.

Many functions are linked to HTML forms. For instance, you can create a form that inserts or updates a record when the user clicks the Submit button. In a typical web application, there is no concept of a current record, so if you are updating a record you need to provide a unique key field to tell the database which record to update.

An irritation is that recordsets have to be defined individually for each page. In the final version it will apparently be possible to copy and paste recordsets across pages. This does give a clue as to how UltraDev works. Each page has its own script to define a recordset. For reasonable performance, it is essential to keep recordsets as small as possible.

A nice feature of UltraDev is that you can apply formatting to fields such as dates and numbers. To do so, first bind some text to the field. Then you can select a format from a drop-down list, including Currency, Percent, Trim, and other common-sense options.

In a web application, you frequently need to pass parameters, such as form values or a key field, from one page to another. UltraDev recordsets can easily use these values. When you define a recordset, you can set a filter, which in effect means an SQL string with parameters. The value of the parameters can come from sources including form variables, URL parameters, cookie values and session variables. A common scenario is where you have a page that lists records in a table and an option to display the detail for any record on a separate page. To do this you would pass a parameter from the listing page to the detail page.



The App Server Info site properties determine which server technology is used. You can convert a whole site simply by editing this property sheet

The Data Bindings window also provides access to server variables. In ASP these are represented by Request, Session and Application objects. If you want information about the user's browser to appear on a web page, you can bind the HTTP_USER_AGENT property to a text placeholder.

Server Behaviors let you add standard functionality to data-aware pages. The Get More Server Behaviors option invites you to download new Behaviors from the web

A problem with Drumbeat was that there was too much black box functionality. In UltraDev, you can edit the generated scripts in the same way as you would edit HTML code. This means that in principle anything you can do with ASP, JSP or Cold Fusion you can also do in UltraDev, although you begin to lose the benefit of the RAD tools.

There are problems with the Dreamweaver approach. The built-in scripts only provide a basic level of functionality and serious web developers will soon find they need to dive into the code. In the beta version under test there appears to be no built-in provision for secure user log-in, an essential part of most real-world databases, and very little in the way of data validation. The question then is whether there is any real benefit in starting with Dreamweaver, or whether it is better to use specialist tools or even a good programmer's editor from the outset. That question hinges on the quality of Dreamweaver's application code and in this respect the beta is not promising. A typical ASP developer will produce clearer and more efficient code than Dreamweaver's generic scripts.

Another problem is that all the script ends up in the web pages themselves, whereas scalable and maintainable web applications minimise the amount of script in web pages and place code into server components instead.

However, Dreamweaver's extensibility means there are likely to be improved and more sophisticated Server Behaviors to address these issues. The real point is that Dreamweaver is primarily for design, not for web application development. That makes Dreamweaver UltraDev excellent for simple dynamic content, but no substitute for more advanced tools.

TIM ANDERSON

DETAILS

★★★★

PRICE £468.83 (£399 ex VAT). Dreamweaver and Drumbeat upgrade deals available

CONTACT Macromedia 0870 6001041

www.macromedia.com/uk

PROS Supports ASP, JSP and Cold Fusion; live data at design-time; extensible environment allows third-party enhancements; runs on Windows and Macintosh

CONS Inefficient generated scripts; real-world applications are likely to need manual coding;.no built-in ecommerce support

OVERALL Dreamweaver is fantastic but UltraDev's database features are only adequate for simple applications

Red Hat Linux 6.2 Deluxe

Red Hat used to be a big fish in a small pond, but version 6.2 must prove itself seaworthy.

Red Hat is one of the longest-established Linux distributions and the first to be split into packages – archived bundles containing all the programs and supplementary files forming an application, allowing the user to add, remove or upgrade individual subsystems in a single operation. This modularity and upgradability made it the first Linux for non-experts and proved highly successful, to the extent that it remains the most widely used distribution in America and, in some ways, the *de facto* 'standard' Linux.

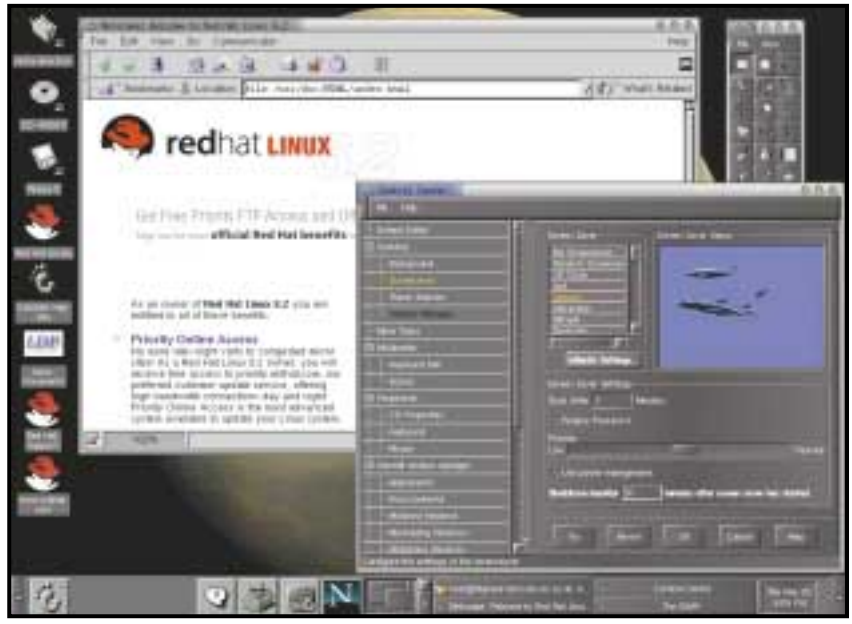
In the past few years, though, rival distributions have surpassed it in some areas and the company's rigorous stance against including commercial components has imposed some restrictions.

Now Red Hat is playing catch-up. Version 6.0 moved to the 2.2 kernel and version 6.1 aped Caldera and added a graphical installation program, Anaconda. This latest version, 6.2 (codenamed Zoot), smoothes out some wrinkles caused by these changes, adds an interactive startup sequence allowing troublesome components to be deactivated and claims better hardware detection. KDE is offered as an alternative GUI, although GNOME – now on its second release – is the recommended default.

Installation is quite easy. A boot floppy is provided, but the CD is bootable and after a prompt launches straight into graphics mode. Like Corel LinuxOS, there's an option to install Linux into a FAT filesystem if you want to keep Windows and don't want to repartition your drive – although this reduces performance. The installer's partitioning tool is pretty basic, though, and only FIPS (Federal Information Processing Standard) is supplied for non-destructive repartitioning; we recommend buying PartitionMagic for this.

There is a selection of pre-configured installations, including server, GNOME and KDE workstations and a custom option which allows packages to be individually selected. The installer can update an existing Red Hat installation from version 2.0 upwards, which is a neat touch. We tried this on 6.0 and 6.1 installations and it worked well.

There were some niggles, though. On a recent notebook PC, all the hardware, including graphics, sound, PC Card slots, USB and power management was correctly detected and configured, but on an older Cyrix machine, vanilla NE2000 and SoundBlaster 16 cards were missed – although the 'Getting Started' manual contained simple instructions on how to add them later.



Red Hat 6.2 offers a choice of GUIs as well as a vast array of skins for that personal touch

Unless you choose a custom install, there's no option as to where to install the LILO boot manager and it silently overwrote PowerQuest's BootMagic. You can choose whether to boot into text or graphics mode, but misconfiguration of the X server on the Cyrix desktop meant that graphics mode failed and had to be configured manually from the command line.

Once installed, the GNOME desktop is pretty good. There isn't the same range of integrated accessories and utilities as with KDE, but a range of helpful non-GNOME tools is included and the GNOME tools include an excellent help system, file manager and a full spreadsheet, Gnumeric.

The choice of window managers and graphical 'skins', wallpapers and screensavers is stunning: GNOME looks more attractive than KDE and is vastly more customisable. The desktop also holds links to helpful websites and local documentation and icons for CD and floppy drives. If you choose to install KDE instead, or even alongside, you get only the default KDE desktop.

The basic version of Red Hat can be downloaded as a CD image from the company's website or installed over the Internet. The Deluxe boxed edition adds 90 days of telephone support, novice-level printed manuals and several additional CDs: documentation and source code as well as free 'PowerTools' and commercial workstation applications. The Professional edition doubles the period of support, which also covers Apache configuration and includes more server-based tools.

Red Hat remains a solid distribution, but it no longer has the technological edge. SuSE is easier to install and includes vastly more software, Caldera is better integrated and has more corporate features and Corel, although immature, is the most user-friendly and Windows-like Linux around.

LIAM PROVEN

DETAILS

★★★

PRICE £64 (£54.47 ex VAT)
CONTACT Red Hat 01483 300169
http://europe.redhat.com/
SYSTEM REQUIREMENTS x86 processor with 16MB of RAM and 500MB of disk space
PROS Easier than ever; widely supported
CONS Poorer integration, features and user-friendliness than the competition
OVERALL Red Hat is the Linux baseline: if you're already familiar with it, it's still a sound choice, but other variants offer more

Snap! Server 4000

If capacity is your priority and complexity is not, then this easy-to-configure server could be for you.

The Quantum Snap! Server 2000 was the company's first tentative step into the world of Network Attached Storage. The Snap! Server 4000 reviewed here is a marked improvement over its predecessor and offers a huge 120GB of storage.

One of the main differences is its physical size and shape. Where the previous version would have looked more at home in the Tate Modern than the average small company, the 4000 is a simple 2U-high, rack-mountable box.

Setting up the hardware is very easy. Simply inserting the supplied CD into a Windows-based PC autoruns the Snap! Assist setup program. It then scans the network for any unconfigured servers – in our case via IPX – and when one is found a wizard is started to guide you through the rest of the configuration.

Configuration completes four tasks: naming the server, setting the administrator, setting the password, setting the time and date, and assigning an IP address. The Dynamic Host Configuration Protocol (DHCP) can be used to assign the address automatically.

Once this has been completed you can fire up the web management through a normal browser. The management interface, although it may not be to everyone's liking, does cover all the basic requirements. It initially comes across as a little simplistic, but, after you have delved into all the available modules, it becomes apparent that there is more there. From here you can set up the disk utilities as well as security and network settings.

Security was our only major bane with the product. By default, the Snap! 4000 is set up with no less than three administrator accounts – any of which can be used to access sensitive information and configuration options. Initially, the setup program sets them all with the same password, but later on in the game the same job would take three operations.

As a result we would advise you to remove two of the accounts and rename the third, as one administration account is all that's needed.

On top of this, when connecting to the management interface, all the usernames and passwords are sent across the network as clear text. There is no option to change this and anyone with a readily downloadable packet sniffer could pick up passwords and compromise your security.

A better approach would have been to provide secure communication and a method for the administrator to change the TCP port – default web traffic runs on port 80 – that the interface runs on.

Thankfully, these are the only real issues we come across with the box. The 120GB of storage comes in the form of four 30GB drives, which allow for RAID 5 (striping with parity), RAID 0 (striping), RAID 1 (mirroring), or you could simply use each of the drives as standalone storage.

Another improvement over its predecessor is that the 4000 comes with an unlimited user licence for PowerQuest DataKeeper. This allows users to backup files on a local computer to the Snap! If anything goes wrong, then previous versions of work that have been stored and compressed will be available.

One of the main problems with networking, especially when you introduce new equipment, is keeping an up-to-date list of users. In this respect the Snap! Server does well and offers a number of approaches. An internal database allows you to input all your user information by hand, but, if you prefer, you can also import an NT Domain or a NetWare Server. Both of these approaches pass the authentication requests onto the relevant third party. With this you don't have to recreate users that already exist elsewhere on the network. Additionally, be aware that NetWare authentication works through Bindary, not NDS, so recent NetWare installations could cause problems.

Whatever method you choose to adopt, the web interface is used to apply permissions to shares on the server. These permissions also work for users who access the server from a web browser. By entering their authentication details in a pop-up password box, users can gain access to their files, although only a method for downloading is provided. For security reasons Quantum does allow this option to be switched off.

The Snap! Server 4000 is a definite improvement over its predecessor, but depending on the size of your network it may seem like overkill. 120GB of storage – 90GB when using RAID 5 – is a lot, and as a result it isn't cheap either. If you do require this amount of storage, but do not want the associated complexity then you could certainly do a lot worse.

DAVID RAE

DETAILS

★★★

PRICE £3,873.98 (£3,297 ex VAT)
CONTACT Quantum 01344 353 500
www.quantum.com
PROS Simple and quick to install and manage; ability to import user detail; RAID capability
CONS Default security needs hardening
OVERALL If you need the space its worth a look

PERSONAL COMPUTER WORLD

BEST BUYS

YOUR GUIDE TO TODAY'S TOP PRODUCTS ››››

ENTRY-LEVEL PC

Atlas
Meridian A750T

Based around AMD's Socket A 750MHz processor, an MSI K7T Pro motherboard and 128MB of PC133 memory, this machine makes use of the latest technology. You get a 20.5GB IBM hard drive and a 32MB Hercules 3D Prophet DDR-DVI. Bonuses are the 17in CTX Trinitron monitor, eight-speed DVD and Mitsumi CD-RW. A killer price for a killer system.

Review *August 2000, p78* **Price** *£1,173.83 (£999 ex VAT)*
Contact *Atlas 07000 285 275 www.atlasplc.com*

MID-RANGE PC

Mesh
Matrix 850T

At the heart of the system beats AMD's Athlon 850MHz with on-die cache. You also get 128MB of PC100 memory and a large 30.7GB Maxtor DiamondMax hard drive. The excellent Hercules 3D Prophet II graphics card drives a 19in Mitsubishi Diamond Plus 91. Mesh has produced a fantastic package for any user after the latest technology at a bargain price.

Review *August 2000, p76* **Price** *£1,761.33 (£1,499 ex VAT)*
Contact *Mesh 020 8208 4706 www.meshcomputers.com*

HIGH-END PC

Dell **Dimension XPS B1000 Special Edition**

The first in the new wave of 1GHz Pentium III-equipped systems, the B1000 Special Edition, partners the power of the 1GHz PIII with 128MB of RAMBUS RDRAM and Dell's custom GeForce 256 graphics card with 64MB of DDR memory. You also get a spacious 30GB EIDE hard drive that can be backed up using the eight-speed CD-RW. A scorcher.

Review *June 2000, p75* **Price** *£3,136 (£2,669 ex VAT)*
Contact *Dell 0870 152 4850 www.dell.co.uk*

FULLY-FEATURED NOTEBOOK

Gateway
Solo 9300 LS

Making use of Intel's 600MHz SpeedStep processor this notebook has blistering performance. The screen and keyboard are both excellent, and the notebook enables you to do some basic video editing using the composite in and out ports at the back through the ATi mobility video card, or for digital video there's a FireWire port.

Review *April 2000, p158* **Price** *£2,243.08 (£1,909 ex VAT)*
Contact *Gateway 0800 55 2000 www.gateway.com/uk*

ULTRA-PORTABLE NOTEBOOK

Sony
Vaio PCG-Z600RE

Sony has taken the ultra-portable genre a step further with this slim, sexy, Pentium III, 500MHz machine with 128MB of RAM and a 12GB hard disk. You also get a 56K PC Card modem and a built-in Ethernet adaptor. With a 12.1in TFT screen sporting a 1,024 x 768 resolution and a Memory Stick slot for Sony's own solid state media, this is the coolest notebook around.

Review *June 2000, p76* **Price** *£2,301.82 (£1,959 ex VAT)*
Contact *Sony 08705 424 424 www.sony.co.uk*

PDA

Ericsson
MC218

Based on the Psion Series 5mx, the MC218 has 16MB of memory and a processor speed of 37MHz. The email software is built into the ROM and supports UUEncoded attachments and MIME. Frames and Java 1.1.4 are supported by the web browser. Ericsson has even bundled an IrDA modem for connecting the device to its range of mobile phones.

Review *May 2000, p204* **Price** *£379 (£322 ex VAT)*
Contact *Ericsson 0990 237 237 www.ericsson.com*

DIGITAL CAMERA

Sony

Cyber-shot DSC-S70

Sony's S70 uses the latest battery technology to provide around 120-150 minutes of usage and is Sony's first genuine 3.3megapixel camera. Image quality is superb. All in all, the S70 is the best all-round 3.3megapixel camera out there.

Review *August 2000, p97* **Price** *£750 (£638.30 ex VAT)*
Contact *Sony 0990 111 999* *www.sony.co.uk*

WEBCAM

Philips

Vesta Pro

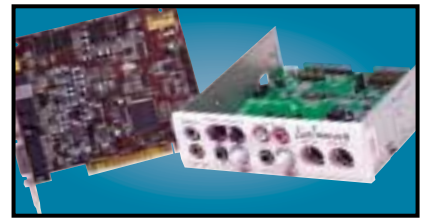
This is a very well designed unit with built-in USB microphone. The 640 x 480 pixel CCD can deliver up to 15fps at VGA resolution or smooth 30fps at lower resolutions down to 128 x 96. An excellent package at a remarkably cheap price.

Review *July 2000, p224* **Price** *£52.87 (£45 ex VAT)*
Contact *Microtronica 01189 633 733* *www.pcstuff.philips.com*

SOUND CARD

Creative Labs

SB Live! Platinum



This is exactly what gamers and budding PC musicians have been asking for – great sound quality and excellent bundled software make it a winner. We think it's the best sound product ever.

Review *February 2000, p83* **Price** *£179 (£152 ex VAT)*
Contact *Creative Labs 0800 973 069* *www.soundblaster.com*

COLOUR INKJET

Hewlett-Packard

DeskJet 930C

This uses the same engine as the higher spec P1100 and is a breeze to setup. Connection is via the parallel or USB interface and drivers allow you to adjust the printed page drying time.

Review *July 2000, p201* **Price** *£130.43 (£111 ex VAT)*
Contact *HP 0990 47 47 47* *www.europe.hp.com*

BUDGET LASER PRINTER

Brother

HL-1250

This compact machine has everything you could reasonably ask for at the price, but Brother has gone one step further with the inclusion of both parallel and USB ports.

Review *February 2000, p165* **Price** *£245.58 (£209 ex VAT)*
Contact *Simply 020 8523 4020* *www.brother.com*

COLOUR PHOTO PRINTER

Epson

Stylus Photo 870

Aimed at the professional imaging user, our test photo was beautifully rendered, there was no evidence of undesirable banding and skin tones were accurately reproduced.

Review *July 2000, p206* **Price** *£207.98 (£177 ex VAT)*
Contact *Simply 020 8523 4020* *www.simply.co.uk*

BUSINESS LASER PRINTER

Hewlett-Packard

LaserJet 4050TN

The 4050TN's 1,200dpi resolution is outstanding, and with a 133MHz NEC processor and 16MB of RAM it can turn out 16ppm. It also comes network-ready as standard.

Review *September 1999, p96* **Price** *£1,422 (£1,210 ex VAT)*
Contact *HP 0990 474747* *www.europe.hp.com*

MULTI-FUNCTION DEVICE

Hewlett-Packard

Office Jet R45

A 600dpi colour inkjet printer, colour scanner and photocopier all in one. Colour output is rich and vibrant. The 30bit scanner supports a maximum optical resolution of 600dpi.

Review *November 1999, p96* **Price** *£364.25 (£310 ex VAT)*
Contact *Hewlett-Packard 0990 474747* *www.europe.hp.com*

GRAPHICS CARD

Asus

V7700

The Asus V7700 uses nVidia's GeForce 2 chip. The core clock speed has been increased to 200MHz and memory frequency boosted to 333MHz, making this card great for gaming.

Review *August 2000, p114* **Price** *£297.30 (£253 ex VAT)*
Contact *SMC Direct* *www.asus.com*

EXTERNAL STORAGE

LaCie

PocketDrive

This tiny external 6GB hard drive has two FireWire ports and a single USB connector. The FireWire ports mean the drive can be daisy chained to other FireWire peripherals.

Review *July 2000, p108* **Price** *£287 (£245 ex VAT)*
Contact *LaCie 020 7872 8000* *www.elacie.com*

EIDE HARD DRIVE

Seagate

Barracuda ATA 28GB

This 28GB beast's spin speed of 7,200rpm helped it achieve 0.89Mbytes/sec in our random read and write test. It's a breeze to install and the £5.10 cost per GB makes it a bargain.

Review *April 2000, p197* **Price** *£160.97 (£137 ex VAT)*
Contact *SMCdirect 01753 550333* *www.seagate.com*

SCSI HARD DRIVE

Seagate

Barracuda ST150176LW

The Barracuda may no longer be at the cutting edge of SCSI performance, but with its 7,200rpm spin speed and 50GB storage space its value for money is outstanding.

Review *April 2000, p202* **Price** *£692.08 (£589 ex VAT)*
Contact *SMCdirect 01753 550333* *www.seagate.com*

SLOT A MOTHERBOARD

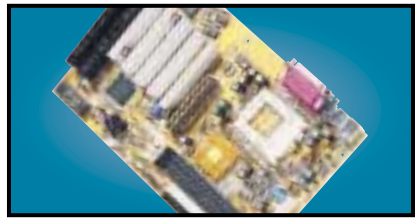
Abit
KA7

This uses VIA's Apollo KX133 chipset with the capability to run the memory at 133MHz plus support for AGP 4x. There are two Ultra DMA 66 channels plus the standard floppy connector and four DIMM banks.

Review *July 2000, p108* **Price** *£129.25 (£110 ex VAT)*
Contact *Dabs Direct 0800 138 5240* *www.dabs.com*

FC-PGA MOTHERBOARD

Gigabyte
GA-6BX7

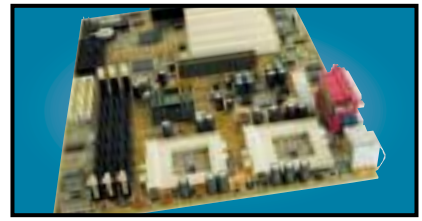


If you are going to use one of the latest Pentium IIIs you're going to need a FC-PGA (Flip Chip Pin Grid Array) compatible board. The GA-6BX7 uses the 440BX chipset and has one AGP, four PCI and one ISA slot. It also uses cheap SDRAM.

Review *June 2000, p98* **Price** *£99 (£84.26 ex VAT)*
Contact *Gigabyte 01908 362 700* *www.gbt-tech.co.uk*

SOCKET 370

Abit
BP6



The BP6 allows you to use Intel's socket 370 Celerons in a dual-processor configuration. Even if you only use the board for a single processor, the BP6 still shines because it is one of the few Socket 370 boards to use the BX chipset.

Review *March 2000, p195* **Price** *£116.33 (£99 ex VAT)*
Contact *Top PC 0113 2422 416* *www.abit.com.tw*

17IN MONITOR

CTX
PR711F

Using a Sony FD Trinitron tube, this monitor's slim casing somehow makes the display seem larger. Image quality is superb and a USB hub is built in to the base as standard.

Review *January 2000, p79* **Price** *£233.82 (£199 ex VAT)*
Contact *Dabs Direct 0800 138 5124* *www.ctxeurope.com*

19IN MONITOR

CTX
PR960F

Equipped with an FD Trinitron tube this has a constant 0.24mm pitch across the screen. It also has an additional BNC input and a built-in USB hub as standard.

Review *June 2000, p91* **Price** *£363 (£309 ex VAT)*
Contact *CTX 01923 810 800* *www.ctxmonitors.com*

21IN MONITOR

Sony
Multiscan G500

The name Sony is synonymous with high-quality displays and this 21in FD Trinitron monitor is no exception. It has dual-input connectors and remains crisp even up to 1,800 x 1,440 at 75Hz.

Review *May 2000, p226* **Price** *£911 (£775 ex VAT)*
Contact *Sony 0990 424 424* *www.sony-cp.com*

LCD MONITOR

Sony
Sony SDM-N50

This TFT display is a svelte 1.3cm thick and the screen is easy to position with its multi-pivoted stand. The display quality is first rate and it even has built-in speakers and a headphone socket.

Review *April 2000, p96* **Price** *£1,291.32 (£1,099 ex VAT)*
Contact *Sony 0990 424 424* *www.sony.co.uk*

SOUND SYSTEM

VideoLogic
DigiTheatre

This set includes five speakers, a subwoofer and an integrated six-channel amplifier plus a decoder. Excellent sound quality at a fair price make the DigiTheatre a must-have.

Review *January 2000, p81* **Price** *£249 (£211.91 ex VAT)*
Contact *Videologic 01923 277 488* *www.videologic.co.uk*

CD-RW

Creative **CD-RW Blaster CD-Studio**

This 8 x 4 x 32 EIDE CDRW package has everything you need to get started. Not only is there an EIDE cable and screws to mount the drive, but also a CD-RW disc and 10 CD-R discs.

Review *June 2000, p192* **Price** *£193.87 (£165 ex VAT)*
Contact *Dabs Direct 0800 138 5114* *www.europe.creative.com*

ISDN TA

Eicon
DIVA USB

Weighing in at 70g and no larger than a mouse, this USB ISDN TA opens up 128Kbits/sec bandwidth and supports G3 and G4 faxing as well as a variety of voicemail and file transfer facilities.

Review *March 2000, p87* **Price** *£99 (£84.35 ex VAT)*
Contact *Eicon Technology 020 8967 8000* *www.eicon.com*

BACKUP

OnStream
SC30

The SC30 has a 30GB compressed data capacity and using Backup Exec it achieved over 70Mbytes/min. Echo software provides drive-letter access so you can treat it like a hard drive.

Review *September 1999, p102* **Price** *£233.82 (£199 ex VAT).*
Contact *OnStream 0800 328 1204* *www.onstream.com*

DVD DRIVE

Pioneer
DVD-115

This 16-speed Pioneer drive is one of a few drives available at this speed. The unit uses a traditional tray loading design and also has a headphone jack and volume wheel on the front.

Review *August 2000, p197* **Price** *£116.32 (£99 ex VAT)*
Contact *Dabs.com 0800 129 3120* *www.pioneer.co.uk*


RE

Past masters

NOSTALGIA AIN'T WHAT IT USED TO BE, BUT IF YOU YEARN FOR THE OLD DAYS GORDON LAING HAS SOME ADVICE ON HOW TO TURN YOUR PENTIUM PC INTO A ZX SPECTRUM OR AN AMSTRAD CPC.

IF IMITATION IS THE SINCEREST FORM of flattery, then the classic home computers and games consoles of the 1980s must be the most complimented electronic devices in the world. Why? Because of emulation. An emulator allows one machine to pretend to be another, and thereby run its software. Take Apple's transition to the PowerPC processor for instance. It used an emulator to run existing software designed for the 68000-based Macs, until native PowerPC versions became available. Intel's forthcoming Itanium 64bit CPU will also feature some kind of emulation allowing it to run existing 32bit X86 software.

But this feature isn't about the serious side of emulation. We're paying homage to home computers with some software emulators that temporarily turn your mighty Pentium PC into a humble ZX Spectrum, Commodore 64, Amstrad CPC, Atari ST or Amiga.

Sure, the games at the time may be visually shocking compared to Quake III Arena, but technical shortcomings are more than compensated for by superb gameplay. So, go on, treat yourself to a trip down memory lane. A couple of brief downloads later and you'll be welcoming an old friend back into your life.

ILLUSTRATION TOM BUCHANAN

Top: Dropzone running under the VICE 64 emulator
Bottom: VICE even lets you improve the sound of the 64's SID chip

A software emulator sits between the original games or applications and your PC hardware, interpreting commands. For example, the original game may want to make a sound, and places a call to the original platform's audio hardware. The emulator interprets the commands to drive the PC hardware in a similar fashion.

An emulator will make use of your PC graphics, sound, storage, keyboard and often mouse and joystick. Some may offer additional facilities such as increasing the display size to fit your screen, or even oversampling the audio to sound even better than the original.

You may have the emulator running under Windows, but the original platform has no concept of drives C, D and so on. Instead the emulator must ensure your PC's drives act like the original cassette player, cartridge slot or rudimentary disk drive. It must also attempt to match the speed of the original hardware.

While the emulators are new cunning interpreters for Windows, the software you run on them is the same as the originals.

The process of transferring the data from the original media to a PC is beyond the scope of this feature but, fear not, plenty of people have already done the leg work. You can find just about any piece of software you want, somewhat misleadingly called ROMs, on the Internet.

We'll list platform-specific sites later, but a great place to start is Vintage Gaming (www.vintagegaming.com), which has emulators for just about every platform, a selection of ROMs, and a great set of links. Emulators are constantly being improved, so it's always worth checking to see if there's a new version available.

While the platforms and games emulated in this feature are 10 to 20 years old and, in most cases, no longer sold commercially, most are still under copyright. Unless you own the original, it's against the law to use an unlicensed copy.

The Integrated Digital Software Association (IDSA) was set up to investigate and close down sites that are distributing software still under copyright, whether they're charging for it or not. The IDSA seems most focused on hunting down the pirating of software for current games consoles, but vintage platforms are also protected. So, while emulators are readily available, many of the games you know and love have become understandably scarce on the Internet.

While we in no way condone piracy, it would seem sensible if the copyright owners of classic software came to an agreement to allow fans to relive their enjoyment. Many programmers, such as Jeff Minter, author of Revenge of the Mutant Camels, have made their old games freeware. We've provided some links, but be aware of the legalities and their implications.

Top: JetPac running on ZX32 – note the handy pause button
Bottom: ZX32's options even include emulating poor memory!

ZX Spectrum

In 1982, Clive Sinclair unleashed the ZX Spectrum to a world (or at least a UK) clearly hungry for a doorstop of a machine with a surprisingly endearing rubber keyboard. We celebrated the Spectrum in March's *Retro* page, but you too can relive the fun with emulation.

The two most popular emulators for the Sinclair ZX Spectrum are ZX32 and RealSpectrum. Both are modest downloads, measuring 255KB and 310KB respectively.

RAMSOFT claims RealSpectrum 'is the world's first emulator offering 100 per cent exact reproduction of all the multi-colour effects commonly seen in demos and some games, not only on the screen but also in the border'. Sounds impressive, but we experienced some difficulties getting it to work on our Windows 98 test system.

We had more success with Vaggelis Kapartzianis' excellent ZX32 emulator, which offers a host of options to increase the size of the display, simulate a bordered TV image, emulate a Kempston or Interface 2 joystick, and even simulate the slowdown of performance during memory accesses. A row of buttons neatly offer system reset, pause and easy loading of Spectrum software. You can also relive the fun of programming Sinclair Basic with the one-touch words such as PRINT and GOTO.

As far as games are concerned, we found ROMs for Ultimate classics such as Jet Pac and Atic Atac at Emunation! (www.emunation.com). Mathew Smith's Jet Set Willy was available at Cowl Innovations (www.cowl.co.uk/spectrum/software.html), but in an authentic attempt to prevent piracy, you'll still need the original piece of cardboard with cross-referenced coloured squares to start playing. Emulators Unlimited (www.emuunlim.com) had a variety of Melbourne House hits including The Hobbit and Sherlock Holmes. All games measured between 14 and 28KB to download.

ZX32: www.geocities.com/SiliconValley/Bay/9932
RealSpectrum: www.vintagegaming.com

Commodore 64

Commodore Business Machines may have started life as the manufacturer of serious systems such as the PET, but in the early 1980s it had become best known for its VIC-20 and CBM-64 home computers. Hiding serious gaming hardware under their beige cases, both became must-haves for kids who felt Sinclair just didn't cut the mustard (*Retro* May 2000).

By far the most popular Commodore 64 emulators are Håkan Sundell's CCS64 and the sinister sounding VICE written and maintained by a number of programmers over the years.

CCS64 is a modest 277KB download that runs in a DOS session in or out of Windows. Once fired up, you're faced with the familiar words: '64K RAM System. 38911 Basic Bytes Free. Ready', but no menu bar. Press F9 and navigate the C64-style menus to open tape or disk images from your hard disk.

VICE is the largest download in this feature,

measuring a relatively whopping 1.69MB, but you get five Commodore emulators, including the C64, C128, VIC, PET and CBM-2. You also get an easy-to-navigate Windows interface with a row of pull-down menus. There's a vast range of options, including refresh rate, video standards and oversampling of the C64's all-important SID sound chip. They don't call it the Versatile Commodore Emulator for nothing.

For the most comprehensive range of CBM-64 titles, head to www.c64.com. Here we found Archer Maclean's superb Defender clone Dropzone, tapped our feet to the incredible music of Rob Hubbard with Thing on a Spring, Monty on the Run and Commando, relived unbelievable gameplay on Andrew Braybrook's Paradroid and even tracked down Andrew Challis' Trollie Wallie, complete with note-perfect Jean Michel Jarre soundtrack! Most games measured around 35KB.

CCS64: www.ccs64.com
VICE: www.cs.cmu.edu/~dsladic/vice/vice.html

Amstrad CPC

In the early 1980s, playgrounds rattled with battles between proud ZX Spectrum and CBM-64 owners, while BBC-B users observed from a safe distance. Amid such home computing bedlam in 1984, Amstrad launched its first computer: the CPC-464. Later to arrive in a variety of configurations, it gained a strong following (*Retro* July 2000).

Our first CPC emulator is 'Arnold' from Kevin Thacker – we downloaded the latest 395KB beta version, which claimed to be for Windows, but appears to be the same as the previous version for DOS. Fortunately, for those who fear a command-line interface, Arnold launches into a window with a familiar line of pull-down menus for configuration. Here you can emulate any of the CPC models, and totally configure the display, sound, storage and system – there's even a cheat database.

Next up is CPC Emulator from Ulrich Doewich and none other than Bernd Schmidt, the man primarily responsible for authoring the core of the Ubiquitous Amiga Emulator, UAE. Measuring 223KB, the CPC Emulator runs in a DOS session, and requires that you navigate through a text-based interface. A few key presses later you've successfully configured the system, pointed the emulator towards your game ROMs and started playing.

Speaking of which, we found a handful of CPC games among the various emulation websites, but by far the best was hidden within Emulation Unlimited. Point your browser towards http://tacgr.emuunlim.com/aa/reviews/reviews_index.html for an index of the highest rated games to be featured in

Top: Highway Encounter running under Arnold – note the display modes Bottom: Arnold's CPC desktop with the choice of Amstrad systems

What inspired the emulators?

It's testament to the programmer's skill that these emulators work as well as they do, but apart from adoration from the millions of downloading fans, what exactly inspires someone to write one in the first place?

Bernd Schmidt was inspired to write UAE because he had an Amiga 500 and wanted to keep some of the software. Schmidt was 'lucky to have a friend who owned the HRM (Commodore Hardware Manual) which he "borrowed".'

Håkan Sundell wanted to know everything about his C64, and was inspired to write an emulator as soon as he bought an Amiga 500 because he 'missed the old machine, its mysteries and the games'. Sadly the Amiga wasn't up to it, but when Sundell had to pick a subject for his Masters thesis, the choice was easy: a CBM-64 emulator for his 486 PC. Sundell says 'the first prototype took at least 1,000 hours and the current CCS64 source code measures over 1.5MB'.

A couple of years ago, Paul Bates was shown the PaCifiST emulator, but was disappointed to discover it wouldn't play his favourite Atari ST game Paradroid '90. He began the basics of an emulator as an experiment – 'Before long I had a couple of my old game demos running and then word got out onto the Internet. Originally WinSTon was planned to be a two-month experiment, yet here I am over two years later and still coding!'

Almost 15 years ago, Darek Mihocka was a first-year university student who had just upgraded his Atari 400 to a new ST. 'Problem was, all the cool software back in the early and mid-1980s was written for 6502-based machines. So in 1986 I started writing a generic 6502 emulator called Xformer. In 1990 I ported Xformer over to MS-DOS and then faced a similar problem: I had my cool Atari ST software which I now wished to run on the PC. So in 1991 I started writing Gemulator. So the inspiration came out of sheer necessity.'

All the authors we spoke to agreed that games aren't what they used to be. Schmidt said: 'Ten years ago, companies would still produce simple but entertaining games. Today, you get the impression they spend more on graphics and movies rather than gameplay. It's also unfortunate that whole genres of computer games have become extinct. There's hardly anything without 3D graphics.'

Sundell agreed: 'Even though the classic games don't have cool graphics and sound, they have something that newer games lack: they're fun to play and can be picked up quickly. Today it's like the game producers start with an extremely cool 3D engine, then try to make a game out of it.'

Bates puts the popularity of emulation down to nostalgia: 'People have fond memories of old games that they spent hours playing. For me it was Paradroid '90. Just seeing it again brings it all back.' Mihocka hits the nail on the head: 'Classic games didn't have the benefit of megapixel 24bit colour displays. You had to convey your idea on a 320 x 240 pixel screen with 16 colours, so games tended to rely more on imagination. In many ways the classic games are very similar to old Hollywood movies – they had content.'

Top: UAE wins all prizes for the most comprehensive system options Bottom: Classic Amiga platform action with Turrican

Top: It's the little green desktop! GEM lives again with WinSTon Bottom: Bubble Bobble is one of the most addictive games ever written

Amstrad Action magazine. We checked out the isometric Alien Highway, the arcade action of Gauntlet 2 and Boulderdash, and the superb Tornado Low Level – all between 16 and 80KB.
Arnold: www.arnoldemu.freeserve.co.uk
CPC Emulator: www.vintagegaming.com

Atari ST

In 1984, the founder of Commodore, Jack Tramiel, left to head up Atari. One year later came the first of many Motorola 68000-based STs, complete with graphical user interface and MIDI ports. We'll be detailing its life in next month's *Retro*.

Like the Commodore Amiga, emulating the Atari ST is a two-step process. Like the original units, you must decide if you're going to play games or use the operating system. The emulator itself provides the first step, but then you must either have a suitable game ROM, or a copy of the Tramiel Operating System (TOS) to experience the remarkable little green desktop.

Which leads us neatly to Paul Bates' excellent WinSTon emulator, available at the Little Green Desktop website. WinSTon measures a mere 175KB and installs itself as a proper Windows application. Upon startup, it requests a TOS image, so make sure you download one of these too. WinSTon's options include emulation of the four popular ST memory configurations, along with the ability to 'insert' images into the virtual A and B floppy drives – very neat.

Darek Mihocka's 209KB Gemulator 2000 goes further and offers emulation of the ST, Mega ST and STE models, along with the Mac Classic and the ancient Atari 400, 800, 800XL and 130XE. Again you'll need ROM images for the ST and Mac options, otherwise you'll only have the prehistoric Atari platforms to play with.

We found most of our ST software via WinSTon's home website, and enjoyed looking up Jez San's StarGlider 1 and 2 and the wonderful platform arcade action of Bubble Bobble. Most of the games were supplied four or five at a time in hacked bundles, measuring 600-800KB, while TOS 1.0 came in at 100KB.
WinSTon: http://lgd.fatal-design.com
Gemulator 2000: www.emulators.com/download.htm

Commodore Amiga

In 1985 the Commodore Amiga hit the scene, boasting several unique components that gave it the edge over competing models. While arch-rival Atari ST also featured a Motorola 68000 at its core, the Amiga backed up its CPU with the help of three custom chips. Charmingly named Daphne, Paula and Agnus, it's the software emulation of this tricky triplet that requires you to have a fair-paced Pentium PC to emulate the Amiga (see this month's *Retro*).

Like the Atari ST, the Amiga requires a ROM with its actual OS before getting started. Known as Kickstart files, these are normally available on the same sites as the emulators, typically measuring around 300KB.

There are only really two Amiga Emulators. One is the 201KB 'Fellow' Amiga emulator by Petter Schau. Running in a DOS window, the initial text-based interface can be slightly daunting. However, a few arrow presses later, the emulator knows where to find a suitable Kickstart ROM and any games you've 'inserted' into the virtual floppy drive. It's not a bad emulator, but pales somewhat compared to UAE.

Justifiably known as the Ubiquitous Amiga Emulator, Bernd Schmidt's UAE is widely considered to be the only one you'll ever need. A 644KB download, UAE installs itself as a Windows application, and gives you a wealth of tabbed options. There are the basic locations of the nearest Kickstart ROM and any disk images you wish to insert into the virtual drives, plus loads of controls for display, sound, memory and processor configuration. It works beautifully.

For game ROMs, the UAE Files Archive (http://uaefiles.cjb.net) has some good links, but for a far better resource of direct entertainment, point your browser to Classics for UAE (http://home6.inet.tele.dk/aqvist/uae). Here we found such Amiga gems as Pang, Speedball 2, and Turrican (600-900KB), which were all as addictive as we remembered!
UAE: www.codepoet.com/UAE
Fellow: http://fellow.vintagegaming.com

Wallow in nostalgia

Emulators do exactly what they say on the tin – once fired up, you're effectively using the real thing. There are a couple of strange concepts to get your head around though. First is that the emulated system is often waiting for a disk or tape to be inserted, so you'll have to load virtual media into virtual drives. Second, you may have to endure a few seconds of flashing screens as the software loads, but it's almost always much faster than the originals started up!

That said, the biggest problem for users of emulators is how to handle the waves of nostalgia as the memories come flooding back! It's time to beat that game just once more. Now all you've got to do is choose your desired platform. Hmmm... Tonight Matthew, I'm going to be a Sinclair Spectrum!

Where to buy the real thing

Who needs an emulator when you've got the real thing? Today there's a huge market in collecting classic systems, and demand for boxed units in mint condition is high.

It's better news for buyers than sellers though, as the high volume of units originally sold keeps prices affordable. Sinclairs and early Commodores tend to go for around £50 in reasonable condition. If you can't be bothered searching through endless car-boot sales, then check out the retro departments of Computer Exchange stores (www.cex.co.uk), or better still, head over to the Vintage portion of eBay's Computer section (www.ebay.co.uk) and start bidding!

Loan rangers

Buying IT equipment outright is a major outlay, but James Taylor explains that leasing could be a better option for small businesses.

Once, the only way to buy IT equipment was to pay in full before you could even take delivery. If you didn't have the money, you'd have to beg your bank manager for a loan that might only cover the equipment, leaving you to scrounge around for extra money to pay for software and services. But now there are more creative financing options.

You may be lucky enough to be able to pay for your equipment out of your own funds. But this could, of course, blow a big hole in your cashflow forecasts, lose you interest and leave you without a cushion in the event of an emergency. The advantage of splashing out your own cash is that you won't have to pay loan interest or rent. It may also be desirable to have IT as a capital asset on the balance sheet, so it can be used as security for general borrowing – which you can't do with some other forms of financing. The disadvantage is that your IT equipment will be a depreciating asset and will become increasingly obsolete.

You can still own your equipment if you take out a conventional repayment loan, in which case the above pros and cons will apply, except that you will have preserved your cash reserves and relieved the pressure on your cashflow at the cost of having to pay interest on the loan.

An alternative form of financing that involves payments by instalments is leasing. Money doesn't come from a bank but from an independent lending company (the 'lessor'). It pays your supplier and charges you (the 'lessee') monthly or quarterly payments that include an element of interest. Although you pay more for your IT, you get to spread the cost over several years (usually between two and five). During the period of the lease, the goods belong to the lessor, not you. Be warned, though, if you are a start-up businesses, you may be excluded because you can't provide the two years worth of accounts demanded by most leasing companies.

The two principal forms of lease agreement are lease purchase and lease rental. Lease purchase is similar to hire purchase in the domestic field. Having kept up monthly rental payments, the final payment is the residual purchase price. Pay that and the goods are yours. Of course, they may not bring much of an asset value to your balance sheet by then. Also not every leasing company offers lease purchase.

Lease rental is by far the most common form of leasing. The main difference between this and lease purchase is that at the end of the lease, the goods remain the property of the leasing company. If you still want to use them, you can pay a much-reduced straight rental charge for as

ILLUSTRATION LIZ COULDWELL

long as you want. Or you can give the goods back to the leasing company, leaving you with nothing (which isn't as bad as it sounds because they're probably at the end of their useful life anyway). Or, as usually happens with goods that have a relatively high built-in obsolescence, you can exchange the old kit for new equipment and start again with a new lease. Leasing helps cashflow by spreading the purchase cost over time and, moreover, because the payments are fixed at the outset, it helps with budgeting.

The other main attraction of leasing is that almost all leasing companies will let you change your equipment part way through the agreed period instead of waiting until the lease expires. Your leasing company will terminate your old lease and issue you with a new one incorporating your new and existing equipment.

Most leasing companies will let you include ancillary costs like software, peripherals, consumables, network installation, maintenance and even web design and ISP charges.

According to leasing specialist Syscap, lease finance is now recognised as an efficient and rational option for funding computer hardware, software and related support services. It provides a flexible and cheap way of keeping pace with technology and can allow you to acquire the IT infrastructure you need when you need it.

Computer Resale offers IT kit and can also help finance the deal

Tony Field of leasing company ECS pointed out that, as well as financial considerations, there is the practical problem of disposing of your IT equipment when you've finished with it. You can't just throw it on the skip or even give it away without complying with expensive EC regulations and the Data Protection Act.

Finding the money

Almost all suppliers of business equipment will also be able to offer finance. There are, however, some fundamental differences in how they go about this. In most cases, the vendor makes arrangements with a finance house and if you want to buy from that vendor, you only have that single choice of financing.

Some single-source suppliers will make their own finance arrangements. evesham.com, for example, uses Evesham Finance, which offers lease purchase and lease rental. Unlike many, who will only deal with businesses that can show two years' accounts, Evesham includes start-ups (with extra security by way of guarantees from main shareholder directors). Customers can upgrade part way through when, subject to a satisfactory record, guarantees may be waived. Managing director Wayne Fowkes said sole traders may have better opportunities with Evesham Finance too.

Dan Technology doesn't ask for security, but does carry out a credit check. Dan's financial director, Peter Hobday, pointed out that banks will probably not finance services because they can't recover those costs in the event of a default and probably won't lend on installations either, without a second charge on directors' homes. Dan's finance service is provided by Syscap.

Elonex provides finance (from Sales Finance & Leasing) to established businesses (sole traders, partnerships, limited companies and PLCs) that have been trading for a minimum of three years. It also covers software, training, cabling, installation, implementation and maintenance. In addition, you can, at various points during the term of the contract, use a predetermined 'exchange allowance' to upgrade your system. If the lease runs its full term, you may either continue to rent the system for a nominal amount (typically the equivalent of one month's rental per annum) or sell it to a third party and share in the sale proceeds. There's a lease payment calculator on the Elonex website (www.elonex.co.uk).

Other vendors take a more flexible approach. For example, collaborative agreements with various leasing specialists, mean retailer MPC can try to offer tailored leasing to accommodate tax advantages, obsolescence, rapidly deteriorating assets and emerging technologies.

You are not limited to buying brand new equipment, however; refurbished machine specialist Computer Resale, with a nationwide network of stores, sells warranted second-hand machines and offers financing too.

However, if you want to purchase equipment and services from several different sources, you can deal directly with the finance house of your choice and make your own arrangements.

One of the better-known finance companies providing a specialist IT-oriented facility is Syscap, which offers business finance terms ranging from one week to five years. As well as providing finance to many retailers, Syscap will also offer finance directly to small businesses. Syscap's web pages offer a near-instant leasing quotation (www.syscap.com).

If you need IT to get online, look at Barclays Bank's new Computer Leasing deal, which includes Internet access through Barclays.net. Small businesses can lease a choice of three PCs from the Compaq Prosignia range at £25 ex VAT per month, plus additional equipment and a pre-installed copy of Windows 98 with Word/Office 2000 (Small Business Edition).

Pros and cons of leasing

Pros	*Cons*
The lessor, in retaining ownership of the asset, has more security than other lenders, and may be able to offer more competitive financing rates.	There may be some restrictions of use, and you'll usually be required to obtain the lessor's approval for your insurance arrangements.
A lease is a medium-term facility that cannot be withdrawn or curtailed by credit difficulties or changes in economic circumstances, unlike facilities such as overdrafts, which are repayable on demand.	If you are a new company starting up you may find it difficult to obtain leasing terms.
The finance rate is usually fixed throughout the term of the lease.	You will not be entitled to any proceeds of the disposal of the asset after the end of its useful life. For some assets this may be significant.
Leasing can offer flexibility in repayments. Some lessors may adjust repayments to match seasonal variations in cashflow.	You cannot claim a capital allowance for ownership of the equipment; the leasing company claims the allowance.
Leasing will usually finance the whole cost of IT (except building work).	Leased assets cannot be used as security for borrowing purposes.

During the 36-month lease, customers can upgrade at any time (with the lease being recalculated) and lease, or buy additional equipment such as printers and scanners.

Taxing times

Whether you buy your capital items outright or pay for them over a fixed length of time, the Inland Revenue will let you set the costs against your tax bill. Most capital items qualify but there are exceptions, notably vehicles. Leasing can offer a tax advantage over purchase because a leasing contract comes to an end, whereas ownership does not. At the time of writing, if you own an item, you are allowed to offset 25 per cent of its current 'tax written down' value against your tax bill every year. In the first year its current tax written down value is the price you paid for it. In the second year, it is the price paid, less the 25 per cent already claimed BUT you can only offset 25 per cent of that lower sum. However long this goes on, you will never offset all of the original price.

In the case of leasing or renting, the instalments, which include capital and interest, are counted as legitimate business expenses and you can offset all instalments paid in a given financial year against that year's tax. So at the end of the lease you will have been able to offset the entire cost of the item against your tax bill.

However, the Government is about to change the balance between purchase and lease for some businesses. For the next three years, between 1 April 2000 and 31 March 2003, the Treasury is proposing to allow small businesses to offset all their 'information and communication technology' in the year of its purchase, but only if it is bought outright.

In addition to computers, this includes peripherals, cabling providing a data connection between computers, or between a computer and a data network (such as an external link to the Internet), dedicated electrical systems for computers, WAP (wireless application protocol) and third-generation (3G) mobile phones, Internet-enabled set-top boxes, bar-code scanners and electronic point of sale systems. It also covers software for all the above.

However, equipment acquired for leasing does not qualify for 100 per cent first-year allowances.

The Government has defined a small business as one with not more than £2.8m turnover, assets of not more than £1.4m and no more than 50 employees. If a company is a member of a group, the group must also be small when the expenditure is incurred.

If your business is within the definition of the Act and you have the money available, it would make sense to buy within the qualifying period of these regulations. If you don't have the money to buy outright, you're reliant on leasing with its built-in three or four-year allowance recovery period. Naturally, this has not excited lessors. Craig Pickering, head of asset finance at the FLA (Finance & Leasing Association) said: 'The FLA would like a tax system which allows SMEs to decide how to finance their IT investments. The Inland Revenue should collect the proceeds, not seek to influence SMEs' business decisions.'

The CBI, Engineering Employers' Federation, Chambers of Commerce, Machine Tools Technologies Association and the FLA all called for leasing to be included in the SME capital allowances package. But don't hold your breath for a change to the proposals.

Take advice

The Government's increase in first-year allowances for IT equipment is good news for small businesses, even though many will not have the cash to take advantage of it. Beware, though, that the Inland Revenue advises individual companies to consult their local Inspector of Taxes on the exact detail of the equipment on which the allowances are being sought.

You can even get quotes online from Sales Finance & Leasing

In considering any form of finance, remember that you will be paying more than if you bought outright and it's best to check all figures with an accountant before committing to any offer. In particular, don't let your choice be driven by perceived tax advantages.

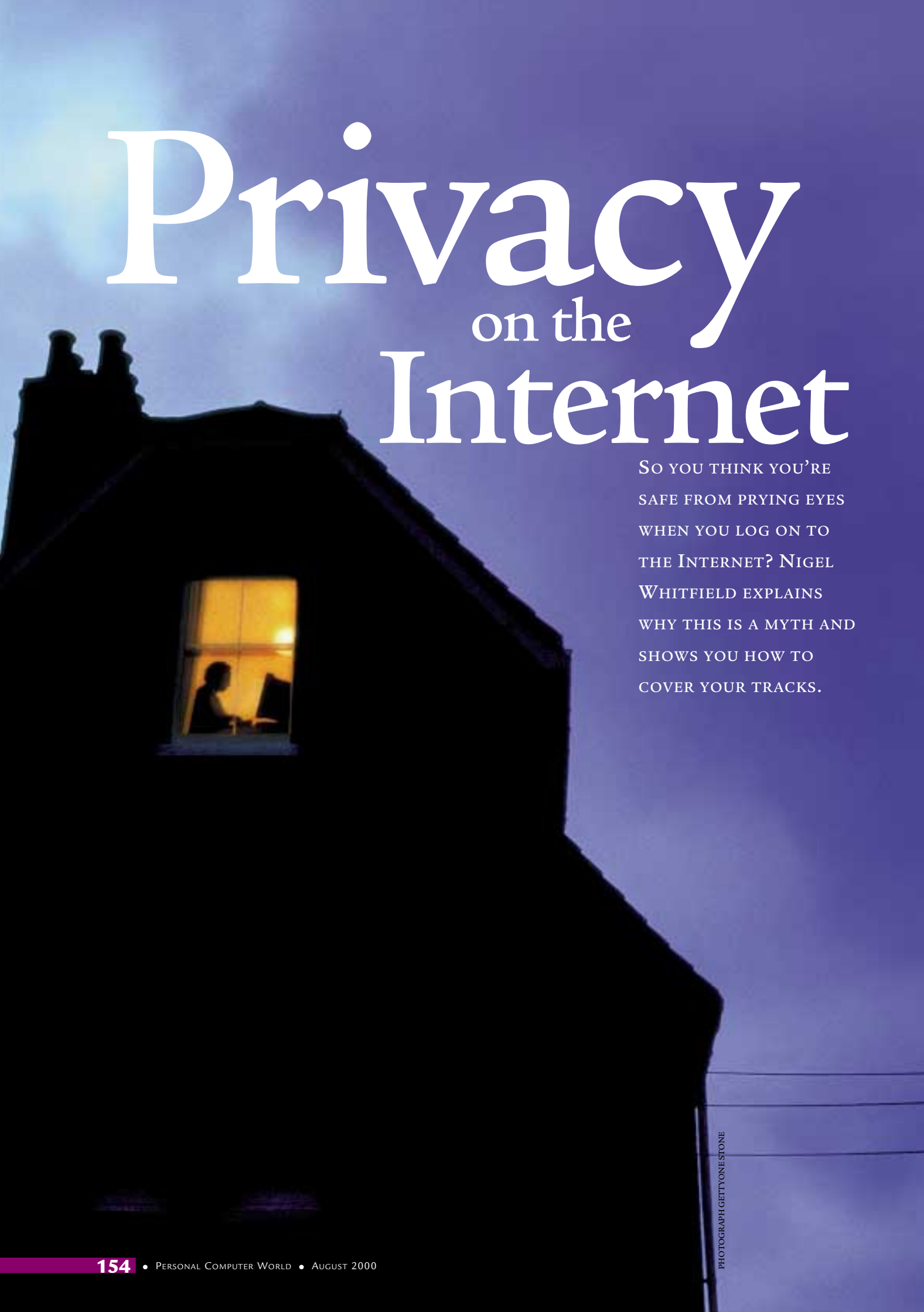
Where to get finance

Financed deals		
Computer Resale	0800 731 8143	www.compresale.com
Elonex	020 8452 4444	www.elonex.co.uk
evesham.com	0800 0353 353	www.evesham.com/index.asp
Dan Technology	020 8830 1100	www.dan.co.uk/
IBM	08457 414 314	www.ibm.com/businesscentre/uk
MPC	01923 249 898	www.mpcnet.co.uk
Independent finance		
Barclays Bank	0800 49 49 49	www.business.barclays.net
ECS	0208 940 2199	www.ecs-group.co.uk
Lloyds TSB	020 7626 1500	www.lloydstsb.co.uk
Lombard	01737 774111	www.lombard.co.uk
Sales Finance & Leasing	01628 829123	www.salesfinance.co.uk
Syscap	020 8254 1800	www.syscap.com
Tax advice		
KPMG	0161 246 4268	www.kpmg.co.uk/
Pannell Kerr Forster	020 7831 7393	www.pkf.co.uk

Further reading		
Business MoneyFacts Lloyds TSB	by subscription £78.50pa	01603 476100
Small Business Guide Which?	Penguin £12	ISBN 0-14-027721-8
Way to Save Tax	Which? Books £14.99	ISBN 0-85202-635-8

Privacy on the Internet

So you think you're safe from prying eyes when you log on to the Internet? Nigel Whitfield explains why this is a myth and shows you how to cover your tracks.



PHOTOGRAPH GETTYONE STONE

There's a widely held belief that the Internet is anonymous. Most people think they can visit websites around the world, safe in the knowledge that no-one can track what they're doing. They think they can join discussion groups and talk about personal issues, such as alcoholism, worries that their partner is having an affair, or dealing with sexual problems, and no-one will know their identity.

People assume that doing all these things – and more – is safe and private, beyond the reach of anyone who wants to find out what's been going on.

But it's all a myth. The Internet may appear anonymous when you can wander into a chat room using a made-up name, and say something as outrageous as you like but, as in Hansel and Gretel, there's a trail of bits left behind you.

If you're concerned about your privacy there are a couple of questions to ask: how visible is your trail, and how hard will it be to follow?

Privacy on the net is an emotive subject, but it's best approached rationally. There is, for instance, little point becoming stressed over an ad agency tracking which of their clients' sites you visit online when you freely hand over a loyalty card in the supermarket each week.

Watch it!

Before you can understand how to protect your privacy, it's helpful to know just what information you're generating when you connect to the net, and how easy this is to trace.

At the very lowest level, when you connect to a site on the Internet, that site will receive a record of your IP address – the unique number that indicates which computer you're using. If you use an ISP like Demon that gives you a fixed address, that's enough to pinpoint your account. With a dynamic address, it'll pinpoint instead the modem line you connected to. Finding out which customer was using that line means matching up a time with the logs from the computers that handle your login. On a busy system that could mean finding one from tens of thousands of entries, but it can be done. This is how the police were able to track the source of the Love Bug virus to a dialup account used by a group of students in the Philippines.

Some systems, such as AOL, might share an IP

Is it a case of RIP privacy?

A hot topic for anyone concerned with privacy on the net is the Regulation of Investigatory Powers (RIP) Bill, presently going through Parliament. It should be on the statute books by October; in fact, it needs to be, otherwise interception of some types of communication will fall foul of the Human Rights Act.

The official line on the Act is that it simply updates the law to provide for interception of electronic communication along the same lines as presently allowed for phones and the post – subject to the issuing of a warrant.

However, there are areas that cause considerable concern to many people. One of the most controversial is the requirement that ISPs provide a means for interception, essentially building into the UK Internet infrastructure an organised system for monitoring. While the Government may pay the costs of setting the system up, it's likely that ISPs will have to pay annual fees, which in the case of the largest could amount to hundreds of thousands of pounds. Given that ISPs are not the most profitable of businesses, many may find that too onerous a burden, despite the contrary claims of a Home Office report.

When the system is in place, an ISP may be notified that an interception is required based on the email address, home address, or postcode of a target. The Bill also provides for interception of the complete IP datastream for a suspect, as well as just email.

Another area of concern is encryption. While the Government has abandoned any plans for a key escrow system – where a 'trusted' party has to hold copies of keys, and will produce them on demand – the provisions in the Bill have worried many people, not least because they appear to reverse the traditional burden of proof in a court.

When encrypted information needs to be decrypted in the course of an enquiry, you will be required to hand over the keys to unlock that data. If you don't comply, you could face up to two years in prison. If you don't have, or never have had, the keys or you have forgotten your password, you have to prove that's the case, or face the consequences. In other words, guilty until proven otherwise. Whether this system will survive the test of the Human Rights Act remains to be seen.

The penalty may even be increased on the grounds that criminals may refuse to hand over keys to data and suffer two years in prison, rather than the longer sentence that might result if incriminating data was exposed.

For more visit www.stand.org.uk.

address between more than one user; the same is true of some corporate gateways to the net, but even so, there will usually be a way to work back to a specific system, even if it involves trawling through pages of log files.

Recording which IP address accessed a site is a start, but it's not enough for many places on the net. They want to know more, like if you've visited before, for instance.

That's done using cookies. There are many myths about cookies, best dispelled by looking at a site such as www.cookiecentral.com. A cookie is simply a piece of information that a website asks your browser to store on your PC. The same site can then request the cookie next time you visit. That allows it, for instance, to automatically fill in your login name on the AvantGo pages, or supply the weather reports you asked for on the MSN.co.uk home page.

What a cookie can't do is trawl your hard drive for your credit card number. It can't tell a website anything it didn't already know about you – and if you tell a site your name is really Cecilia instead of Charles, then that's what will be in the cookie that's stored on your computer.

So why do so many people get worked up about cookies? Simple. Because a few companies, most notably DoubleClick, have found a way round the fact that a server can only request cookies for its own site.

DoubleClick is an ad agency that supplies the ads that appear on many of the net's most popular sites. Using cookies, DoubleClick can uniquely identify you, building up a profile of what type of sites you visit, and displaying appropriate adverts.

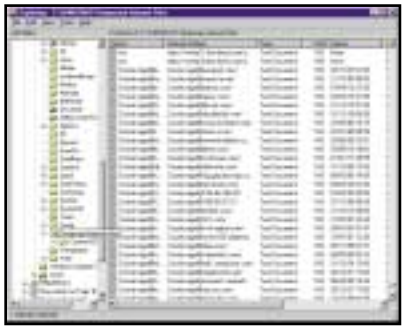
How can it do that when cookies are unique to a site? It's simple – the DoubleClick adverts aren't on the site you visit. They're stored on DoubleClick's own servers, and your web browser dutifully fetches them from there. That means it's requested information from the DoubleClick server, and so it can have a cookie sent, or passed back to, that server. The link to ad will indicate which client site it's come from, allowing a profile of the type of sites you visit to be built up, even supplying relevant adverts for you.

I am not a number

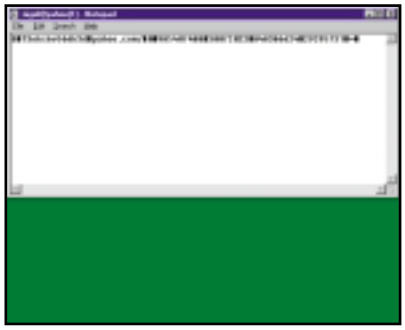
As long as none of the sites that you visit requires you to register, you're just a number – a unique ID that lets people analyse trends, but keeps your true identity private.

Register for a site, however, and information

How to find cookies on your system



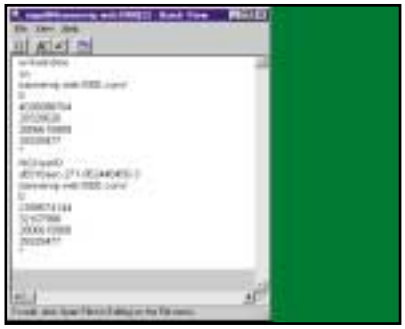
Purging your browser's history isn't enough to cover your tracks. Many sites leave a cookie on your computer, which will last far longer than any history list. Open your Windows\Temporary Internet Files folder, and you'll see a list showing plenty of items from sites you've visited; sort by Type, and all the cookies will be grouped together, as shown above. On systems where you use a login name, each cookie will begin with the name of the user who owns it.



1 Each cookie is just a text file; double-click to open it and you'll see the information that it contains. In many cases, such as the one above, it'll just contain a random ID number for a particular site, along with the expiry date and the domain it belongs to. Some cookie files, however, may contain a user name that you use on that site.

2 Older versions of Internet Explorer stored cookies in \Windows\Cookies, so check in there to see what other cookies lurk on your system. Netscape stores all the cookies in a single file, cookies.txt, which you'll find in the sub-directories of Netscape's users folder, for example, \ProgramFiles\Netscape \Users\nigel\cookies.txt. Mac Netscape users can look at their cookies in the Netscape Users folder within the System:Preferences; the file is called MagicCookie.

3 This is the content of Netscape's cookies.txt file – each line corresponds to a cookie, giving the domain name, the path, whether or not there should be a secure connection, and expiry information, as well as the cookie data itself, in the last column. The first TRUE/FALSE entry specifies whether the cookie can be used by the whole of the domain to which it applies.



4 Microsoft's QuickView is a better bet for opening cookies than Notepad. If they're stored in the Temporary Internet Files folder, then you can see the expiry date and when they were last accessed – the Cookies folder doesn't store that information. Times are stored in the Unix time format – seconds since the start of 1970.

5 Users of Internet Explorer on the Mac have the best solution – from the Cookies option in Preferences, you can see all the cookies on your system, and just a simple click will display them clearly, with all the information formatted correctly. Sadly, you can't edit a single cookie to corrupt its data.

that you supply, such as name and address, age, nationality and so on, may be passed back to the advertising company. In the US, DoubleClick has caused a storm by buying a traditional marketing agency, stoking fears that comprehensive online and offline profiles about people could be built up.

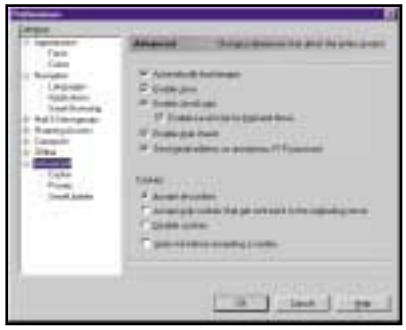
If you're using a fixed net link, it doesn't even take registration to glean at least a little more information about you. Commonly available tools can turn an IP address into a real street address – or at least the address of a person who registered a particular domain, or had a certain range of addresses assigned to them. So, for example the IP address 212.161.108.129 can be traced to 32-34 Broadwick Street, London W1 – the home of *PCW*'s publishers, VNU.

One way of hiding the websites you're visiting is to go via a proxy, then the address that appears in the web server's logs is that of the proxy server. Of course, all that's really doing is adding another link to the chain, since the

QUICK TIP

Editing the cookies for ad services by changing random parts of the information will ensure that they find it hard to track you accurately. You can also mark the cookie as 'read only' in Windows to stop it being updated.

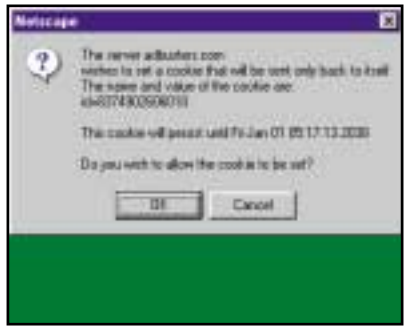
Keeping your web habits private



With a little work, it's fairly easy to stop people gathering information about your web habits, both online and if they have access to your PC. Netscape users can tell the browser to ask them before accepting a cookie in the Advanced section of the Preferences window. You can also disable JavaScript on the same screen, which stops sites finding out things such as the resolution of your screen, or the time zone of your PC – but other features will no longer work.

1 Clearing the disk cache makes sure that people won't be able to see what you've been looking at. You can also change which folder information is stored in, so you could cache everything on a removable drive, like a Zip, if you don't mind the resulting slower performance. That way, you'll have the convenience of caching, without exposing your files as much. Changing the path will also fool security exploits that rely on knowing the location of files on your PC.

2 The main Navigator preferences in the browser let you set how many days worth of sites are stored in the history – which is a .dat file in your user preferences folder. Again, you can clear this out to prevent people being able to see where you've been, but you'll need to do more cleaning up after quitting the browser to be really safe from prying eyes.



6 This is what's left in the Temporary Internet Items folder after you've used the Clear button. To get rid of the cookies, you'll have to delete them manually. There may be a few that you want to keep, to save having to type login information for some sites you visit regularly. In that case, delete the others, set the ones that you want to keep to 'read only' to stop them being updated, and tell your browser not to accept any other cookies.

7 Netscape users will see this box when they've asked to be warned about cookies. Although the dialog says that it will persist – there's no option in Netscape to automatically reject only persistent cookies – you can stop it persisting by making your cookies.txt file read only, as explained in step three. Click Cancel if you don't want to accept the cookie.

8 Internet Explorer displays a fairly uninformative message when a cookie arrives, if you've asked to be warned. Click on More Info, however, and you'll see a display similar to this one, giving full information about the cookie that's being sent. For sites such as this, a dummy ad network demonstration via www.privacy.net, you could make a note of the ID, then edit it in the cookie file to prevent accurate tracking of your web activities.

QUICK TIP

You can hide the websites you visit by using Anonymizer, at www.anonymizer.com. Type the URL you want to visit into Anonymizer's web page, and you'll see the site over an encrypted connection.

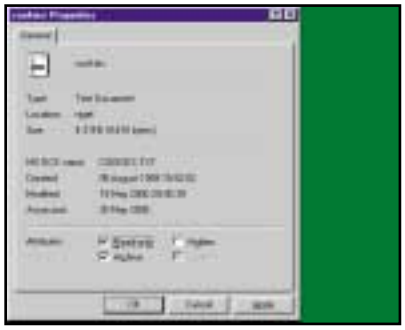
proxy server will have a record of what you're asking it for.

This is also what makes proxy servers a useful tool for those who want to see what you're doing. Even though you may not think your web requests are going via one, many ISPs use 'forced' proxying. That means that all web requests are routed via a transparent proxy. You don't need to change any settings in your browser, but the effect is the same. And for an organisation or country that wants to control and monitor what people are seeing on the web, it's ideal.

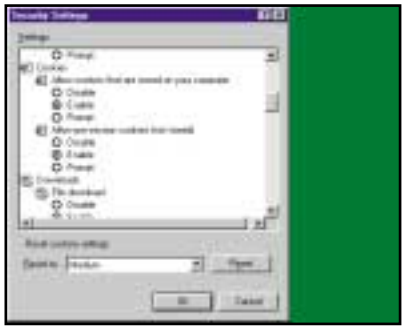
More than the web

There's much more to the Internet than the web, of course. Email is one of the most popular ways of communicating and, once again, everything you do – the sender of each message you receive, or the destination of each message you send via your ISP's mail server – will appear in logs.

A trivial tweak of an alias file could forward a



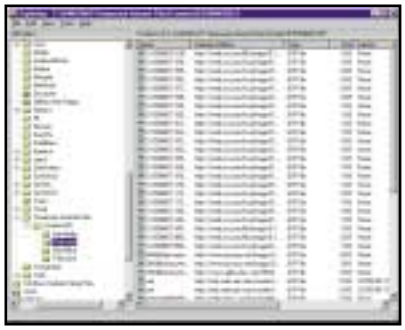
3 If you don't want to be bothered with the prompts each time a cookie arrives, you can instead right-click on the cookies.txt file in your Netscape user preferences folder, and set the Read Only attribute. That has the effect of making cookies 'session only'. They'll work within a browsing session, but they're not saved when you quit the browser. You could also edit the cookies file so that it only holds those for sites where you really do want them saved.



4 In Internet Explorer, choose Internet Options from the Tools Menu, then Security, Internet Zone, and click on Custom. Scroll down to find the options for cookies. IE allows you to set different options for session cookies, and persistent cookies. The same dialog box lets you specify options for scripting and Java.

5 The General tab allows you to set how long pages are stored in the history, and the size of the Temporary Internet Items folder. You can empty stored items from that folder using the Clear button, but cookies won't be erased – just images, pages and other items. You'll also have to look elsewhere (see next page) to completely cover your tracks.

9 Even if you clear history and cache files, some traces will still be left behind. After you've quit the browser, you can tidy up the hard drive on your PC. This is the Windows\History folder, which has folders for each site you've visited. You can delete all the files here safely, but remember that to really cover your tracks, you should use a proper file wiping tool, to prevent an undelete program from recovering a list of sites you visited.



10 IE5 could almost have been designed to leave a trail on your hard drive. As well as the Temporary Internet Items folder, you'll find information, including cookies, in sub-directories under the Content.IE5 folder too, so you'll need to erase all those if you want to be sure of stopping people from seeing where you've been browsing. And while some versions of IE used just the Temporary folder, or just the Cookies folder for cookies, IE5 appears to use both!

11 Netscape's cache folder – there's one for each user – is a little harder to interpret, since items in it have random names but, nevertheless, the files in it can still be opened if someone's determined to see what you've been looking at, so once again, it's a prime candidate for completely wiping if you want to maintain your privacy.

copy of all your incoming mail to someone else and it's not much more work to intercept outgoing messages. Following the introduction of the Regulation of Investigatory Powers (RIP) bill later this year, all ISPs will have to provide a means to intercept email when a warrant is issued.

Depending on the type of network used, it may already be easy for other people to read your messages, and in some countries, companies have no qualms about looking at the contents of email that their employees send or receive.

Besides email, just about any other connection-based service on the net can be logged, with a computer somewhere recording the time and source of each connection it receives. And with access to the network your information is passing over, such as via your ISP, it's theoretically possible to monitor each packet of data, examining its source, destination and contents.

Don't forget that your movements can be tracked when you're offline too, by anyone with

QUICK TIP

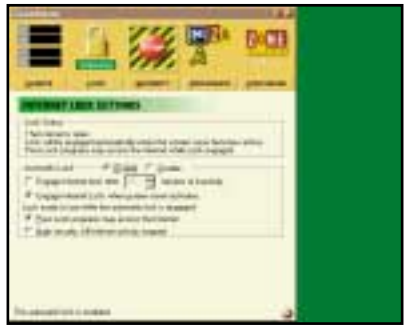
If you don't want your email address known, make sure you use a modern web browser – some older ones send your address each time you download a file via FTP.

Using Zone Alarm to increase your PC's security

When you connect to the Internet, you're also at risk from malicious programs, received via email, IRC or from websites. Some of those, such as BackOrifice, could give people access to your computer, so a firewall of some sort is essential. ZoneLab's Zone Alarm is free for personal or non-profit use, and can be downloaded from its site at www.zonelabs.com. The latest version will also stop you executing VBS scripts received over the net – such as the Love Letter virus.

1 After you've downloaded the file from the net, just run it and you'll see a screen similar to this one. Installation is simple, and you'll just have to answer a couple of questions about whether you're using it for personal or business use, and which folder it should be put in. After installation, restart your computer, and Zone Alarm will run automatically, protecting your system right away.

2 This is the main screen; even if you close this window, Zone Alarm will carry on running, and you can relaunch the control centre by double-clicking the icon in the system tray. The bars on the left show net activity, while the Lock and Stop buttons allow you to restrict or halt Internet activity immediately.



6 The Configure button displays this panel, allowing you to turn off the automatic loading of Zone Alarm, and whether or not it's always floating above your Internet apps – which can be a little annoying if you don't have a large monitor. Business users will have to pay for their copy of the program after a trial period; you can change registration details via the button at the bottom of the panel.

7 The Lock screen lets you turn an 'Internet lock' on and off, giving additional protection, for example whenever the screensaver kicks in. That way, you can have greater access when you're using the computer, and you don't have to remember to do anything when you take a break. The 'Pass Lock' option means that some programs can carry on accessing the net, even when others are locked out.

8 While Zone Alarm is running you'll see a warning like this when some net activity is detected – though not necessarily as soon as you start a program. The message appears when the program starts to access the Internet, and you can grant permission each time, or have Zone Alarm remember your decision. The control panel will tell you which programs are accessing the net at any time.

QUICK TIP

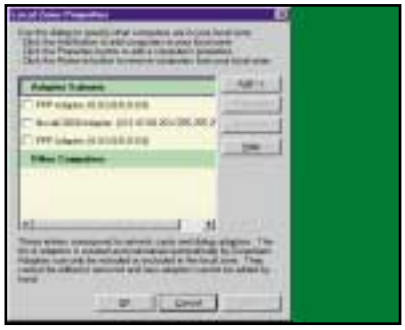
Netscape and Internet Explorer store cookies in different places, so you could configure one to reject cookies for casual browsing, and use the other to visit only 'trusted' sites where you're happy to accept them.

access to your PC. Your web browser will record all the sites that you've visited in its history file, and some pages will be cached. It's not that hard to turn the history and cache files back into a list of sites or pages. People have already fallen foul of the law because of the traces left on their computer after they've visited sites.

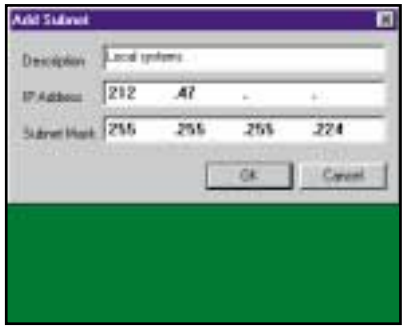
Some recent security exploits have showed that it's possible to read a file on a PC if you know the path – something that's dismissed as not too likely by browser writers. But there's a safe bet, for instance, that if you use Netscape and accepted the default options, you'll have a file called C:\Program Files\Netscape\Users\default\netscape.hst, or cookies.txt, either of which could reveal information about your habits if read by someone else.

The truly paranoid might decide never to use the Internet, so great are the opportunities for tracking what people do. Or the complacent may fall back on the old adage that the innocent have nothing to fear.

3 To start with, click the Security button to reveal this screen and check that the settings are suitable. If your computer is on a network with others, you'll need to make sure that they can access any resources they need on the protected system. For most users, the default settings will be OK. At the bottom of the screen, you'll see a checkbox for protecting you against script viruses received via email. Unless you have a good reason, ensure that this box is checked.

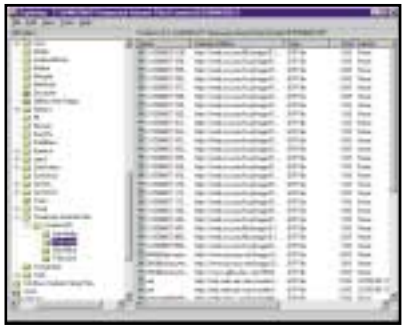


4 Click the Advanced button, and you'll see this screen, which allows you to specify other computers that you want to include in your 'local' zone, which will allow them a higher level of access to your PC – perhaps being able to share files, for example. Click the Add button to create a new entry.



5 Rather than specifying a single machine, you can use a network number and hostmask, as we've done here, to add a whole range of TCP/IP addresses. For most users, this will be a private IP address range. The numbers you enter here should match those that you have configured for the other hosts on your network. Add the new entry, click OK, and then OK again to close the Advanced settings dialog box.

9 The programs panel lets you set options for each of the Internet applications on your system, including whether or not that program can act as a server, receiving incoming connections. IRC, for instance, needs to do that for some functions like DCC to work properly. The Pass Lock column lets you specify if the program can run when the net is otherwise locked, and for each program you can set different options for the local zone and the net.



10 This is the alerts screen, which lets you review all the connection attempts that have been made to your computer, so you can see if someone's been scanning it for Back Orifice, for example. If there's a particular service running on your system, such as Windows File sharing, that someone tries to connect to, you'll also see a warning message when they attempt to connect, and you can allow them if you know who it is.

11 Click on the More Info button when you're viewing an alert, and your web browser will attempt to look up information on the ZoneLabs site, where you'll also find more details about how to set up popular programs to work with the improved security of your system. And that's all there is to it – with just a few clicks, you've dramatically increased the security and privacy of your computer.

As ever, the truth lies somewhere in between. You can take steps to protect yourself, to stop the marketing companies making your life into a data set for their analysis by managing cookies properly. And you can prevent your partner knowing what websites you've visited using a service like anonymizer.com.

But while you can take comfort in knowing that the sheer volume of information generated across thousands of computers by the millions of net users makes it hard to single out one person for attention, rest assured that if an official agency really wants to know what you're up to, it can make a pretty good stab at finding out.

Privacy on the net isn't a complete myth, and the casual user can follow some of our simple steps in the walkthroughs above and on the previous pages to increase it. Ultimately, privacy or the lack of it are very similar online – both can be arranged, but you need to be pretty determined to achieve either.

QUICK TIP

Discover what tricks and tips are used to find out about you by visiting www.privacy.net, and asking for an analysis of your connection.

THE HUMBLE PEN HAS BEEN DRAGGED KICKING AND SCREAMING INTO THE DIGITAL AGE.

The write stuff

THE PEN MAY BE MIGHTIER than the sword, but it has been losing out somewhat with the advent of email and the web. However, a Swedish company called Anoto, working in tandem with Ericsson, has developed what it calls the Anoto Pattern, a new system that promises to drag the humble pen into the 21st Century.

The device is slightly fatter than your average ball-point pen. This extra space is needed to accommodate a camera, battery, processor, enough memory to store an entire notepad of handwriting and a wireless Bluetooth transceiver. Plus, of course, the usual ink and nib. Remove the lid and you've switched it on. Cap it and it's turned off – as simple as that.

So how does it work? Well, the company has created a virtual sheet of paper half the size of the US, an area of more than 4.6 million km squared that would take 73 billion A4 pages to cover. It then overlayed this area with a fine pattern of tiny dots. This covers the paper without ever repeating itself, with each 0.1mm dot slightly dislocated from a strict grid arrangement.

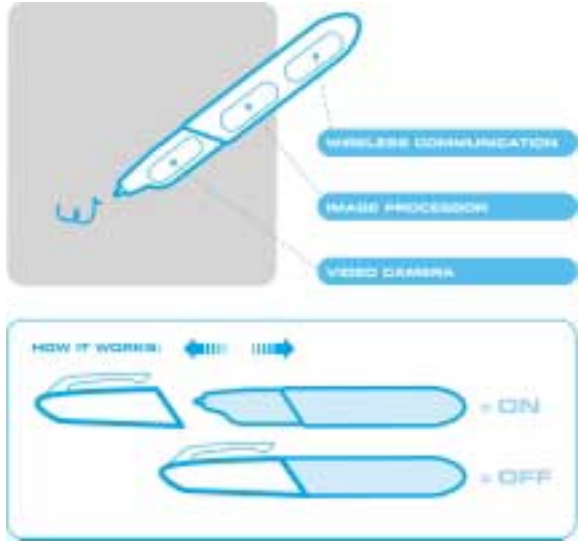
The system is due for release some time in mid-2001 and by then companies will be able to buy their own 'domain' within the pattern. This could be anything from several full pages to just a small square.

Let's imagine that we are a florist and we've bought ourselves a 100mm square. Within this area we could print an order form for use in the local paper using our square of the pattern as a background. As the reader fills in their address details, the Anoto pen, which must be used for the system to work, would watch the dots passing by, taking 100 snapshots a second and storing the characters drawn. It would also recognise when the user ticked the box for a dozen roses because the pattern enables it to know its exact location within the full 4.6 million km square area to the nearest 0.03mm. Because we are the only company printing with that particular section behind our advert, we could also be sure that it would know the information it was gathering was for nobody else but ourselves.

At the bottom of our advert we would print a small 'order' box, much like the 'submit' button on a web form and when the user ticked the area inside it, the pen would enable its wireless Bluetooth transceiver and send the data to their similarly equipped mobile phone. The pen handles dialling into the Anoto gateway and passes the information to a server connected to the Internet. This interrogates the patterns, works out the intended recipient and passes on the translation as an email, fax, SMS or whatever is deemed appropriate.

Of course, it's not restricted to advertising. Anoto already has a set of standard forms that includes space for phone numbers, so you can write and send an SMS using a pen. The company also has diary inserts that effectively allow you to enter data into Outlook using plain handwriting. You could even draw a map and, by hand-writing an address in a designated box on the bottom of your notepad, send it to your colleagues by email. As the technology develops and matures, so more and more uses will be discovered and developed.

Anoto believes that before the end of 2005 its invention will be as common as the mobile phone, but to achieve this it needs to make the technology accessible to end users. It plans to do this by making money from the licensing of its paper and hardware technology, yet at the same time making sure that the additional cost passed on to the end user is low enough to keep the device at a consumer-friendly price. If Anoto can pull it off, it'll change the way we view and use pens and paper for good.



NIK RAWLINSON

ANTS' CHEMICAL DEPOSITS ARE REVOLUTIONISING PROBLEM-SOLVING APPLICATIONS.

Let's work together

COMPUTER SCIENTISTS are getting excited about bugs. Not the Y2K kind, but insects. Swarm behaviour is providing new insights for solving difficult problems.

Biologists have long puzzled over how the individual actions of single creatures on the small scale can lead to complex group activity on the large scale. How is it that ants can discover the shortest paths from their colony to sources of food? The answer, first discovered by Jean-Louis Deneubourg of the Free University of Brussels, is that as they travel, the ants deposit chemicals called pheromones. These mark the trails which are later detected by other ants.

Imagine some ants whose colony is near a food source. Ants will start wandering off from the colony, leaving trails of pheromones as they explore. Some ants will find the food source, then return to the colony, following their own trails back. The route they took is now doubly saturated with pheromones. Other ants are attracted to the high concentration of pheromones and take the same route, which soon becomes the main route from colony to food. It's also the shortest, because those ants that discovered it will have got back the soonest. The other routes gradually fade out, as their pheromone markers evaporate.

Follow the pheromones: Ants' talents have inspired the IT world

PHOTOGRAPH MOVIESTORE COLLECTION

The relevance to computing lies in the problem of finding the shortest path between points – a problem central to communications networks. Consider a travelling salesperson, who has to visit a number of cities, passing through each only once. With knowledge of only a few cities and their interconnections, it's not hard to solve the problem, but as the number of cities grows, the possibilities for travel become unimaginably huge.

Researcher Marco Dorigo of the Free University of Brussels has used techniques based on ant behaviour to provide fast solutions to the problem (http://iridia.ulb.ac.be/~mdorigo). He imagines ants travelling between the cities at random, depositing pheromone trails which slowly evaporate. By repeating this process many times, eventually the ants' favoured paths converge to a shortest-path solution.

Paul Kantor of Rutgers University is using a similar approach in a web-searching scheme he calls 'Ant World' (http://aplab.rutgers.edu/ant/). Kantor's idea is to make web searching a co-operative process, by enabling searchers to draw on the results of others, and to add their own experience to a common pool of knowledge.

Just as an ant marks its path with pheromones, the web searcher is able to mark 'information traces' along the links between web pages. Kantor calls these traces 'digital information pheromones'. Because the links between websites don't have a physical reality, the digital pheromone traces are stored in a separate database. Ant World attaches itself to your browser (currently only Netscape) and whenever you do a web search, you're invited to submit comments about the suitability of the pages you've found. Your results are stored centrally on the Ant World server in Kantor's lab.

Ideas from ant behaviour are also being applied to robotics. IBM researcher Israel Wagner is using ant-based methods for controlling the behaviours of mobile robots (www.cs.technion.ac.il/~wagner). One application is to marshal the robots to clean a room, and the same techniques are applicable to sweeping a minefield. Wagner has some Java applets showing how his robots can behave. And at the University of Alberta, Ronald Kube is using swarm behaviour to make a group of robots work collectively to push an object towards a light source (www.cs.ualberta.ca/~kube/).

Swarming methods are also appearing in financial analysis, production line optimisation, and optical networks. Bugs, once the bane of programmers, suddenly have a lot to offer.

TOBY HOWARD

Speed is all very well but there are some applications, such as web design, where there are more important points to consider than how fast your computer is. We challenged 10 suppliers to come up with a package aimed at web developers – read on to see how they fared.

Web

Although here at *PCW* we tend to get excited – possibly a little too excited – by the latest, largest and fastest hardware around, there's more to life and more to PCs than a mere numbers game. A computer isn't much good unless you do something with it, so this month the emphasis has come off absolute speed, and we've asked manufacturers to come up with machines to cope with a specific and increasingly popular task: website development.

Anyone who's tried developing HTML pages will know that while the basics are easy, things rapidly start to get complex and time-consuming as soon as any degree of sophistication is required. Consequently, the emphasis here is on software that makes the often-tedious task of designing and maintaining a site as trouble-free as possible.

Web design is a software and brain-dependent activity, not something that ordinarily requires massive amounts of hardware power. So we placed a limit of £1,500 on the price and stipulated only that machines have a sensible minimum basic spec, plus some form of backup, Internet connectivity and, of course, HTML and image-editing software. That said, however, where a vendor managed to provide a machine that was sensitive to the needs of the task at hand as well as featuring fast hardware, we rewarded them appropriately. As you'll see, most manufacturers rose to the challenge with considerable aplomb, but others were apparently unwilling or unable to provide any degree of customisation and sent us machines built to a standard specification. Draw your own conclusions. What we can say is that although the results were varied, the best of these machines show that, despite the hundreds of PCs that pass through *PCW*'s labs every year, manufacturers continue to surprise us with the quality and value for money that can be had if you're prepared to shop around.

PHOTOGRAPH DAVID WHYTE

in focus

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• *PCs tested and reviewed by David Fearon*

Carrera **Octan M800**

THIS IS THE LATEST in Carrera's long-running Octan range. The most striking feature of this system is its 21in Iiyama Vision Master Pro 502 monitor, the only 21in unit in this test. The screen doesn't use the latest tube technology, but has a standard Diamondtron aperture-grille tube which is flat in the vertical direction rather than the newer Diamondtron NF variety with completely flat screens. That said, it's a very good quality unit, and the large viewable area lets you run at a resolution of 1,600 x 1,200 without straining your eyes. The monitor is driven by a Matrox G400 DualHead graphics card. Its superior 2D image quality makes it the best choice for a PC that will be used for 2D applications.

Processor speed is in the upper range of this group, with an 800MHz Athlon processor providing power aplenty, complemented by 256MB of PC100 SDRAM on a single DIMM, leaving two sockets free for upgrades. Hard disk size isn't hugely impressive in this company: the 20GB Quantum Fireball is the minimum you should expect for a machine at this level, although in real terms you'll have a job filling it unless you start doing video capture. Backup is provided by a Matshita CD-RW drive.

Inside the tower case the cables are neatly routed, giving full access to RAM and CPU. The unused AMR (audio modem riser) backplane slot has been occupied by two extra USB connectors.

The only really disappointing aspect is the software bundle – which is non-existent. The only web software you'll get is Microsoft's free FrontPage Express, which is woefully inadequate for any serious development work. Input devices aren't too inspiring either – the cheaper variety of Key Tronic keyboard with a dull, lifeless feel to the keys, and a bog-standard two-button Microsoft Intellimouse. There is, however, a PCI ISDN adaptor.

The Octan M800 is a good all-purpose PC, but to turn it into a serious web development tool you'll need to spend extra cash on software, and probably a more responsive keyboard.

DETAILS

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CONTACT Carrera 020 8307 2800
www.carrera.co.uk
PROS Great 21in monitor; good basic machine
CONS No decent software
OVERALL A good base platform, but not as well-tailored as the best of this group

FEATURES	★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Dell Dimension XPS T800

DELL'S ENTRANT comes in the familiar but professional looking tower case. As the name suggests, the XPS T800 sports an 800MHz processor, in this case an Intel Pentium III. It looks like 256MB has now supplanted 128MB as the standard quantity of RAM for a mid-range machine, since, like most of these systems, the Dell has 256MB of PC100 SDRAM on a single DIMM. Bolstering the fast processor and RAM is a Maxtor Diamond Plus hard drive, providing an exceedingly healthy 40GB of storage which should easily last 18 months to two years, especially if you regularly archive your projects via the Sony CRX140E CD-RW.

The all-important monitor is a Dell-rebadged Sony unit, with a 19in FD Trinitron flat-screen tube. It's a great display, with the characteristic sharpness and vibrancy of Trinitron screens making it easy to use during all-night JavaScript coding sessions. Running at a resolution of 1,280 x 1,024 at 85Hz is no problem.

Internal construction is disappointing with internal EIDE and power cables not routed neatly, although access to the CPU and two free DIMM sockets isn't restricted. The Dell-badged motherboard provides a shared PCI/ISA expansion slot, which could be a useful home for an old network interface card.

The Dell QuietKey keyboard is among the best, with a responsive, tactile action. A Microsoft three-button Intellimouse provides good control.

The 800MHz PIII powers the machine to the highest SYSmark score, and the company's own 32MB GeForce 256 graphics card also gives it the third highest 3DMark result, although out-and-out speed isn't a particularly important factor for these machines. A DualHead Matrox card would be more appropriate here.

Although we asked for PCs geared toward web development, Dell provided only Microsoft Office 2000 Small Business Edition – a good package, but not relevant for the purpose since it doesn't include FrontPage 2000. As with the Carrera, this means a substantial extra outlay to get up and running.

DETAILS

PRICE £1,761 (£1,499 ex VAT)
CONTACT Dell 0870 152 4850
www.dell.co.uk
PROS Fine monitor; good keyboard
CONS No HTML or image-editing software
OVERALL A good machine, but it doesn't conform to what we asked for

FEATURES	★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Elonex Prosentia 4000

ELONEX APPRECIATES that as well as a standalone Internet connection, a web development machine is likely to be attached to a server on the local LAN to test pages in anger via a local server. Consequently the Prosentia has an Intel 10/100BaseTX NIC fitted as well as a BT Speedway ISDN adaptor. Elonex has also included Macromedia's Dreamweaver 3 HTML creation package and Fireworks web graphics app. These cost several hundred pounds separately, so they're an excellent inclusion.

The presence of Fireworks and Dreamweaver has led to compromises elsewhere though. The Prosentia comes with a 19in Elonex-badged monitor, but it's fitted with a shadow-mask tube, resulting in a curved screen and a less than pin-sharp image. And Elonex has eschewed the now near-standard CD-RW drive in favour of a cheaper internal EIDE Iomega Zip 250. This is a worthwhile device to have, but is neither as cheap to run (Zip media are far more expensive than blank CDRs), nor as portable, since other machines must also sport Zip 250 drives to be able to read the media. It is a much faster medium for quick on-the-fly running backups though.

Processor speed is middle of the range, although the 700MHz Pentium III is still quick enough. A full 256MB of RAM ensures that you can run several apps at once without the system paging to the hard drive excessively.

If you need some relief from your work, the Hercules 3D Prophet DDR DVI card will provide the goods for 3D games, but the extra cost could have gone towards a CD-RW.

The Prosentia's keyboard is a flimsy-feeling affair that, with its dull key action, won't make long coding sessions very rewarding. A three-button Intellimouse partially compensates for the keyboard.

Overall the Prosentia is pretty well geared to web development, and so despite its flaws it's worth a look.

DETAILS

PRICE £1,761 (£1,499 ex VAT)
CONTACT 020 8452 4444
www.elonex.co.uk
PROS Very good software; ISDN adaptor and NIC
CONS Monitor less than ideal; no CD-RW capability
OVERALL Elonex is on the right lines with this machine, but it doesn't quite measure up to the best of the rest

FEATURES	★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★★

evesham.com Webmaster

THIS IS THE FIRST of our machines this month to make use of the dual monitor facility offered by the Matrox G400 DualHead graphics card. It's supplied with both a main 19in monitor and a secondary 17in unit. For a web development platform this is an excellent idea: you're bound to be running more than one app simultaneously most of the time.

Less inspiring is the quality of the two displays, both Evesham-badged shadow-mask units. They give acceptable but not super-sharp image quality and relatively poor power regulation, leading to irritating screen wobble when opening and closing windows. For a superior dual-monitor solution, look to the Mesh.

HoTMetaL Pro version 6 is the software supplied here. Also included is MGI's PhotoSuite III Platinum, but this isn't exactly Fireworks and is aimed more at the home computer hobbyist than web design professionals.

DVDs, CD-ROMs, CDRs and CD-RWs are all handled by the Samsung combo drive. This saves expansion space and leaves two 5.25in bays free, but makes it less convenient to directly copy a CD. A neat feature of the system's case is a screwless expansion backplane – cards are held in place by a slider mechanism. There's a shared PCI/ISA slot free as well as three dedicated PCIs.

The lefties among you will appreciate the three-button symmetrical Logitech mouse, which is as good as Microsoft's equivalent model, although the Ceratech keyboard has spongy, dull keys with no life in them.

Core components of the Webmaster consist of a 750MHz AMD Athlon processor, supported by 256MB of SDRAM on two 128MB DIMMs, and Maxtor Diamond Max hard drive offering 30GB of storage capacity – a good all-round base.

All credit to evesham.com for a good attempt, but there are other machines here that are more impressive.

DETAILS

PRICE £1,763 (£1,500 ex VAT)
CONTACT evesham.com 0800 038 0800
www.evesham.com
PROS Well thought out, with a good display solution and reasonable software
CONS Slightly higher quality monitors wouldn't have gone amiss; others have better software packages
OVERALL Once again evesham.com is on the ball, but this PC is outshone by the winners

FEATURES	★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Gateway Performance 700

GATEWAY HASN'T BEEN impressing us with its machines lately, an example being the 1GHz Select 1000 system in the July issue. Unfortunately, the Performance 700 continues the trend.

Outwardly impressive, coming as it does wrapped in an imposing full-tower case, the spell is broken as soon as you remove the side panel and look inside.

First, the 20GB Western Digital hard drive is attached to a Promise ATA66 PCI card, thus wasting a PCI slot on a feature other manufacturers have integrated into the motherboard. The internal cabling is untidy, hindering access, and the six spare drive bays are wasted since there are only two power connectors free. The power supply itself is a mere 200w – most other systems here have 250w supplies, even though they have fewer spare bays. The single shared expansion slot is occupied by the PCI modem, so to install an ISA device you'll have to mess about.

The 19in monitor, while large, is a shadow-mask unit that exhibits similar quality to that supplied with the Elonex system: adequate but leaving plenty of room for improvement. Instead of a CD-RW drive Gateway supplied an internal Zip 250 drive, an inferior solution for archiving or data distribution.

The news isn't all bad, but it's not earth-shatteringly good, either. The system's 700MHz Pentium III, while not at the top of this group's speed range, is a capable enough processor, and the single 256MB PC100 SDRAM DIMM is a welcome inclusion. A GeForce 256 graphics card with 32MB of DDR (double data-rate) RAM, Boston Acoustics satellite/subwoofer speakers and Microsoft Works Suite 2000 are good features but fairly superfluous to the purpose. Given that others in this group manage 256MB, a faster processor, CD-RW drive, better display, construction and more relevant software for only marginally more cash, there's no way we can recommend this system.

DETAILS

PRICE £1,676 (£1,427 ex VAT)
CONTACT Gateway 0800 552 000
www.gateway.com/uk
PROS Reasonable basic specification
CONS The tower case is wasted by an inadequate power supply; construction is poorly thought out; the ATA66 card was a stop-gap solution that other vendors ceased to use months ago
OVERALL It's hard to believe that a company as large as Gateway can get it so wrong

FEATURES	★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★

Mesh Matrix Web 750 Developer

IN STARK CONTRAST to the Gateway system, Mesh's machine is tailored to the task at hand. Mesh, like evesham.com, has included two monitors to take advantage of both outputs of the Matrox G400 DualHead graphics card. Mesh has gone one up on evesham.com, though, by supplying two of Mitsubishi's newest 17in flat-screen Diamond Pro 720s. Despite the fact that you get less screen area overall than the Evesham's 19in/17in setup, we much prefer this arrangement because of the far superior image sharpness and vibrancy afforded by the Diamond Pro's Diamondtron NF flat-screen tube.

Mesh has gone for the most sensible optical drive solution – a Pioneer 10-speed DVD-ROM drive and a separate Matshita CD-RW drive, making disc-to-disc copies easy.

The Mesh has its down sides, primarily the 128MB memory capacity rather than 256MB. Also slightly below par capacity-wise is the 20GB Western Digital Caviar hard drive. Neither of these are major drawbacks, however.

A look inside reveals excellent construction, with all cables neatly routed and clipped to the case, giving unimpeded access to the two free DIMM sockets and 750MHz Athlon CPU.

Software consists of full versions of Macromedia Dreamweaver 3 and Fireworks 3, plus a 30-day trial version of Flash 4. The two monitors make learning the packages far easier, since you can have the online HTML tutorials maximised on one screen and the apps themselves on the other.

The Mesh is supplied with the current Rolls-Royce of rodents, Microsoft's silver Intellimouse Explorer, with optical movement sensing for cursor control unimpeded by rogue fluff. The Microsoft Internet keyboard provides better responsiveness than most, plus shortcut buttons for your email client, calculator and so on.

Mesh has put together an excellent system that is only just pipped to the post for the Editor's Choice award.

DETAILS

PRICE £1,761 (1,499 ex VAT)
CONTACT Mesh 020 8208 4706
www.meshcomputers.com
PROS An intelligently put together machine, ideally suited to web development
CONS Less memory than most; slightly smaller hard drive too
OVERALL An excellent system that deserves your attention

FEATURES	★★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★★
OVERALL RATING	★★★★★

Panrix Tekstation 750

PANRIX'S ENTRANT this month is basically well-specified, although there are a couple of quirks. The 750MHz AMD Athlon provides the processing grunt, while a 30GB Maxtor Diamond Max Plus hard drive delivers plenty of storage speed and capacity.

The system only has 128MB of PC100 SDRAM, in contrast to the majority in this test, which sport 256MB. And while the system's Ricoh CD-RW drive is welcome, there's a glaring omission – it won't read DVDs, and there's no standalone DVD-ROM drive. This is an unforgivable slip given that this machine is intended for developers who are likely to need access to up-to-date forms of media.

Like Carrera, the extra USB connector on the motherboard has been used to good effect, with two extra ports occupying the backplane position of the redundant AMR slot. Audio is from the chipset integrated onto the motherboard.

Graphics are handled by a Diamond Viper II graphics card with S3 Savage 2000 chipset. This provides neither the dual-monitor features and 2D image quality of Matrox solutions, nor the 3D performance of nVidia-based cards, so it's not the choice we would have made. The Viper drives a 19in Hansol 900P shadow-mask monitor: although Hansol monitors are inexpensive, we were impressed by the quality of the unit, which gives the sharpest display of the 19in shadow-mask monitors in this group, although it can't compete with aperture-grille units. Instead of a modem, Panrix has installed a BT Speedway ISDN adaptor, a good choice given the reduced cost of ISDN at the moment, but soon to be superseded by ADSL.

The important question of bundled software is neatly answered by Dreamweaver 3 and Fireworks 3, so no complaints whatsoever on that front.

The Tekstation is £100 cheaper than the best of this month's bunch, but the lack of a DVD drive, average graphics card and low complement of RAM puts it out of the running for an award.

DETAILS

PRICE £1,644 (£1,399 ex VAT)
CONTACT Panrix 01132 444 958
www.panrix.com
PROS Ideal software; reasonable monitor; the cheapest machine here
CONS No DVD drive; less than sparkling graphics card and minimum acceptable RAM
OVERALL The Tekstation doesn't quite hit the sweet spot this month

FEATURES	★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Simply Systemax Athlon 750 R Pro

SIMPLY COMPUTERS' own-brand PCs have managed to establish themselves quite firmly in a fairly short time frame, and the 750 R Pro does nothing to disgrace the name.

Helping the 750MHz Athlon CPU is a full 256MB of PC133 SDRAM, the only machine this month to sport this faster variety. It's also got and ISDN TA for Internet connection.

Occupying the fascia of the system are a Ricoh Combo DVD/CD-RW drive and a Creative CD-ROM drive for disc-to-disc copies. The Creative drive is a CD5220 52-speed unit. Fast CD-ROM drives can be awfully noisy, but a cunning Turbo button means it'll only try to go at full pelt when you request it.

The system's most obvious feature is its monitor: a CTX PR960F with 19in FD Trinitron tube. This is a superb display, which won a Recommended award in the April issue. Simply has installed the USB control software, allowing you to set up the display via Windows, much more convenient than hunting through the on-screen menu system, good though it is. The presence of the display's USB hub means you get eight USB ports to play with – four on the monitor and four on the machine, since the Systemax, like the Carrera and Panrix, has two extra ports installed on the backplane.

The most impressive aspect of the Simply is its software bundle. Not only do you get Dreamweaver 3 and Fireworks 3, but also Microsoft Office 2000 Professional, which costs over £400 ex VAT as a separate package, or over £200 if you buy the upgrade. We rarely see Office 2000 Professional bundled even with business systems, so its inclusion here is a bit of a coup.

The machine's not perfect: internal cables could be a lot neater, the two USB ports block a PCI blanking plate, and the dull Ceratech keyboard is a bit of a let-down. But overall, taking that superb software bundle, monitor and hardware into account, these are minor quibbles.

DETAILS

PRICE £1,763 (£1,500 ex VAT)
CONTACT Simply 08707 297 366
www.simply.co.uk
PROS Unbelievable software bundle; superb monitor; 133MHz RAM
CONS Untidy internals
OVERALL A machine that'll deliver maximum productivity from the word go, and a worthy Editor's Choice winner

FEATURES	★★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★★
OVERALL RATING	★★★★★

Viglen HomePro P3-700PWr

AS THE NAME SUGGESTS, the HomePro P3-700PWr sports a 700MHz Pentium III, with 256MB of PC100 SDRAM sitting in the Intel 440BX chipset-equipped motherboard.

In terms of screen area, the Viglen beats all-comers this month with not one but two 19in ADI E66 monitors. Their quality is adequate for running at a resolution of 1,280 x 1,024 if you can live with a slightly soft image, which will give you over 2.6 million pixels of Windows desktop real estate to play with. The graphics card, a Matrox G400 DualHead, makes the most of the image quality the monitors have to offer.

All-round specification is among the best of this group. As well as the 256MB of RAM there's a 27GB IBM Deskstar hard drive, Pioneer's latest DVD-ROM drive giving 16-speed DVD-ROM read capability, and Sony's popular and capable CRX140E CD-RW drive for backup and archiving. There's a full house on the external connectivity front as well: a Realtek network interface card, Eicon ISDN terminal adaptor and Diamond 56K PCI modem. The drawback of all this communications hardware, however, is a lack of free PCI slots. There are two spare ISA slots, but there can't be many people with two ISA devices they'd need to plug into the machine. If you do want to open the system up and add devices or plug in more RAM, however, you'll find the internal cables neatly routed, giving unfettered access to all the relevant parts of the system.

Web development is catered for by Microsoft's FrontPage 2000, a package that many web designers dislike due to its near-unreadable HTML code production, but it's a fully-featured and powerful app. Microsoft's Works Suite 2000 provides a raft of workaday applications, including Word 2000. The silver optical Intellimouse Explorer and Internet keyboard complete a well-rounded picture, and overall the Viglen walks away with a well-earned Highly Commended award for its troubles.

DETAILS

PRICE £1,761 (1,499 ex VAT)
CONTACT Viglen 020 8758 7108
www.viglen.co.uk
PROS Two 19in monitors, fully decked out with comms devices; a great all-round system
CONS No free PCI slots; Microsoft FrontPage isn't the first choice of most designers
OVERALL Another fine entry from Viglen, worthy of anyone's shortlist

FEATURES	★★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

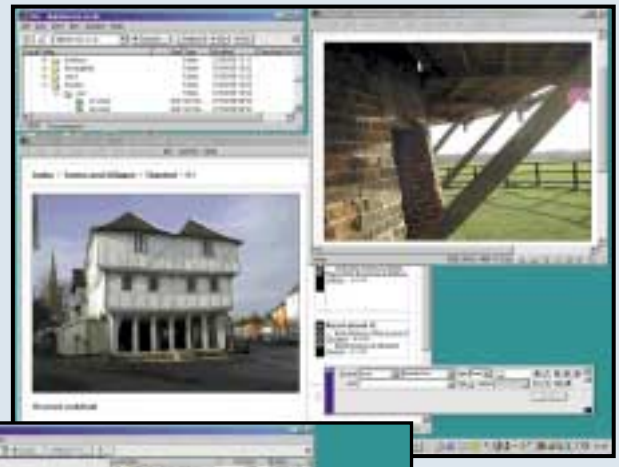
Dreamweaver versus FrontPage

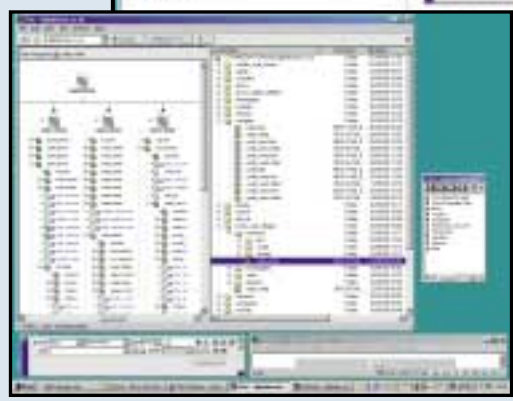
Like office suites and PDAs your choice of web-editing software is a very personal thing. There's a good chance the one that came with your PC or office suite is the one you have stuck with and you'll defend it to the hilt should anyone suggest their alternative does the job better. Many die-hards claim that Windows Notepad is the best web editor ever designed, but plainly these spanner heads are just too clever for us mere mortals. While Notepad allows you more flexibility and control than any WYSIWYG editor could ever provide, you'll not see it being used to create sites such as www.vnunet.com, www.nationalgeographic.com or the BBC's homepages.

The two packages you're most likely to see in use are Dreamweaver from Macromedia and Microsoft's FrontPage. Essentially they both do the same thing – design and upload websites – and both do it well, but they go about their business in fundamentally different ways.

By first making FrontPage affordable and then bundling it with certain versions of its office suite, Microsoft ensured it would be widely accepted, particularly in the home market. Its popularity was enhanced through the extra functionality afforded it through a set of proprietary extensions. Allowing users to create threaded discussion forums, integrate databases and generate impressive rollovers, ensured that its fan base quickly grew. The downside, though, is that the extensions must be installed on the server and many hosting companies charge you extra if you want to take advantage of this facility.

Dreamweaver, on the other hand, keeps things simple. It generates pages that can be hosted on any server. That doesn't mean its use is limited, though. The interface is totally customisable, allowing you to add and remove components. In a corporate environment this is welcome, allowing systems departments to tailor each installation to offer a unified working environment company-wide. Users worldwide have welcomed this with open arms and various sites are springing up, whether official (http://exchange.macromedia.com/) or unofficial (http://people.netscape.com/andreww/dreamweaver/) providing whole libraries of templates, behaviours and actions.

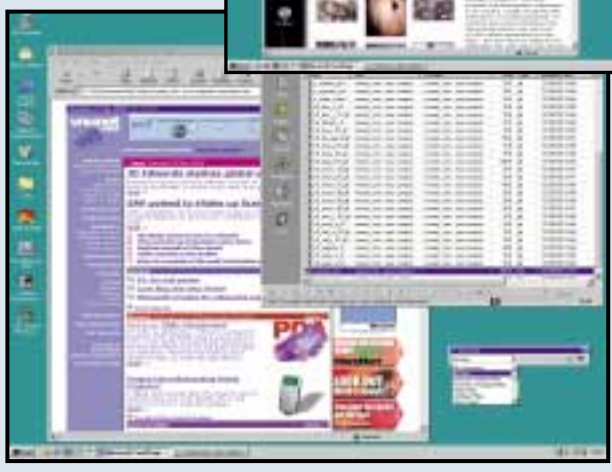




Dreamweaver users would benefit from a larger screen, with its interface split into various windows

Dreamweaver and FrontPage also have very different interfaces. While FrontPage sits quite happily on a 15in monitor and, since the site and page designing modules were combined, will run everything within a single window, Dreamweaver benefits from 17in and above and splits the interface across several windows. These differences reflect the most likely users of each package, for while the corporate user might have the budget to snap up a second monitor or 21in display, a home user's budget might not be able to stretch to such lengths.

This isn't to say that Dreamweaver is unsuited to home use. Although Dreamweaver will set you back £263 and FrontPage a mere £100 from many online retailers, Dreamweaver's *modus operandi* and usability features ironically make it perhaps more suited to the first-time user. All element tweaking takes place through a single object properties inspector, unlike FrontPage that employs myriad commands and input boxes. This same inspector allows you to literally point at files in the site map that will then be dragged into the page as the pointer snaps back to the inspector. It also benefits from a history palette, allowing you to roll back changes, even past the point at which you last saved, or even export all your actions up to the current point so that they may be reloaded and used in future projects.



Frontpage's affordability and extra functionality has ensured its popularity, but there are drawbacks to Microsoft's kit

If you are not using bundled web-design software, therefore, your choice will most likely be decided in terms of budget, which seems a shame when Dreamweaver repays so generously the extra money you'll spend on acquiring it. In this group test, though, where the focus is squarely on professional and semi-professional web designers, we can't help but acknowledge that Macromedia has the upper hand.

NIK RAWLINSON

Watford Aries Perfecta 7500

THIS IS A GOOD STAB at a decent machine. As far as core components go, however, the Perfecta is under-specified in this company, with a 600MHz Pentium III and 128MB of PC100 SDRAM, although raw speed isn't so much of a concern here as it normally is.

Compensating for the less than cutting-edge processor are some good ancillary components. You get the excellent CTX PR960F 19in flat-screen monitor, driven by a Matrox G400 MAX DualHead graphics card. This is one of the few MAX G400s in this test, and its higher RAMDAC speed allows better quality at the very highest resolutions, as well as a higher absolute maximum res. A stonking great 40GB Maxtor Diamond Max hard drive purrs away inside the machine.

The Perfecta sports the new and popular Ricoh DVD/CD-RW combo drive but, unlike the Systemax system, it isn't partnered by a standard CD-ROM drive for easy disc-to-disc copying.

Inside the system the cabling is very neat enabling full access to the three free DIMM sockets and four free PCI slots in the Gigabyte 440BX-based motherboard, although the power supply is mounted on its side in front of the power supply, making it hard to get to the CPU. Incidentally, the CPU itself is a Socket 370 Flip Chip device mounted on a Slot 1 converter card. With two front-panel 5.25in bays free it won't be difficult to make up for the lack of a standalone CD-ROM drive.

Like the Viglen, Watford has gone for Microsoft FrontPage 2000 as its HTML creation application, partnered in this case by PhotoDraw 2000, not a bad combination. Input is catered for by the fine combination of Microsoft Intelli-mouse Explorer and Internet keyboard.

Watford has produced a competent machine, but with only the single optical drive, lowish basic spec and the conspicuous lack of any on-site warranty it's prevented from gaining a Highly Commended award.

DETAILS

PRICE £1,763 (£1,500 ex VAT)
CONTACT Watford Electronics
0800 035 5555
www.watford.co.uk
PROS MAX graphics card; very neat build; big hard disk
CONS A little low-powered; no on-site warranty; no standalone CD-ROM
OVERALL A worthy machine that misses out on an award by a hair's breadth

FEATURES	★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Meeting the need for speed with ISDN

Many of the forward-thinking manufacturers in this group test have recognised the need for fast Internet connections and have included ISDN adaptors as well as a standard modem.

ISDN, or Integrated Services Digital Network to give it its full name, has been around for over a decade and, in a nutshell, allows digital data to be transferred via the telephone system through an ISDN card or terminal adaptor.

A conventional modem works by modulating the output signal into a form that can travel through the telephone line. At the other end, the receiving modem demodulates the signal back into digital form.

In contrast, ISDN removes the translation necessity and uses a digital signal throughout from originating station to destination.

There are many benefits to using an ISDN line rather than a conventional modem. First, and probably most relevant to the majority of users, is the speed of connection. An ISDN link on a single channel is capable of connection at 64K, compared to 56K with conventional modems. However, with ISDN the figure of 64K is the actual connection speed. The reason for this is the digital signal is not affected by noise or signal degradation in the same way as an analog signal, which accounts for the lower connection speed of modems.

With less signal degradation than modems ISDN transmits data faster

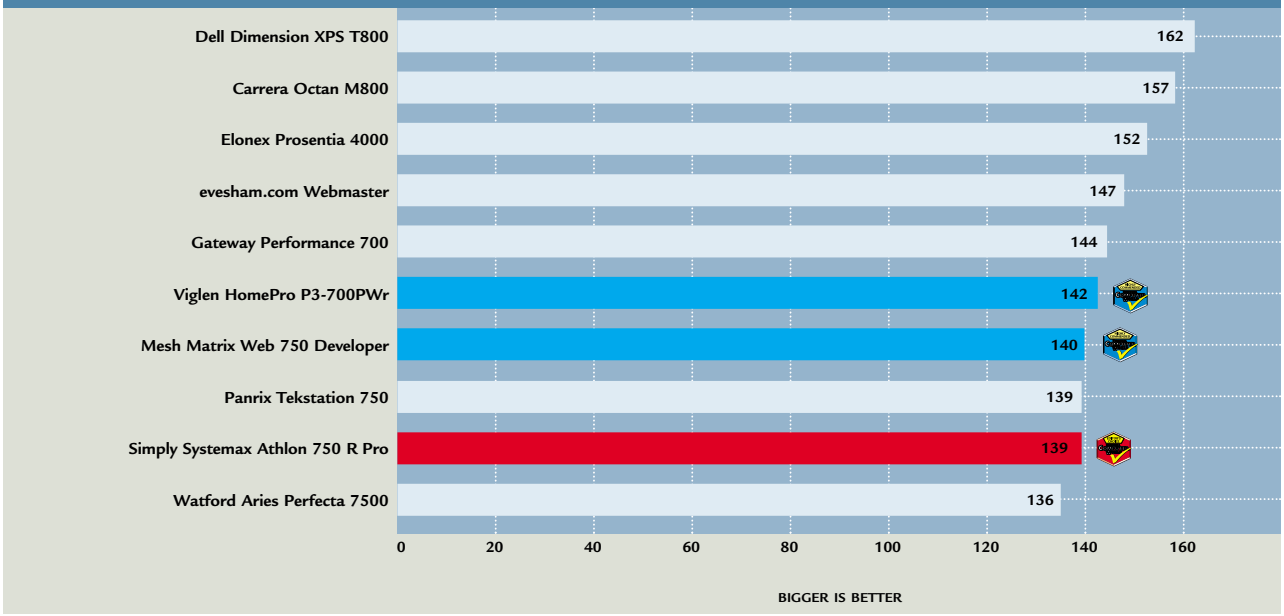
The ISDN link is also capable of connections over two channels, giving a combined speed of 128Kbits/sec (although this uses a second line and incurs the cost of a second call). The benefits of this speed include Internet pages appearing faster, as well as enabling download times to be reduced from hours to a matter of minutes.

One of the main problems with ISDN is the overall cost. Not only do you need an ISDN card at around £50, or a terminal adaptor at around £100, but you also need a junction box fitted to your existing phone line. BT currently has an offer where it will cost you £50 to fit a box that allows you to keep your current phone number, while gaining a second analog line and a further two digital lines. But then there is the monthly charge to consider, which is currently £25 from BT, although this usually includes some bundled calls.

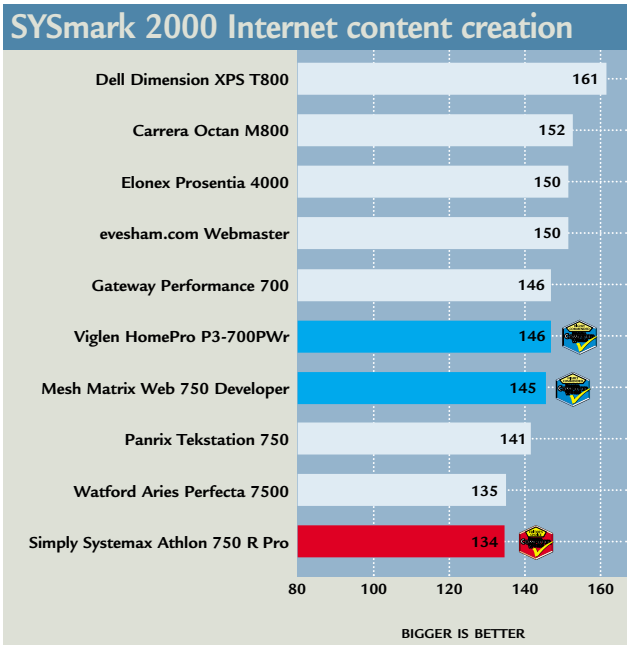
However, ISDN is already under threat from the looming spectre of ADSL, the 'always on' 512K high-speed digital access system. The jury is still out on the issue, but the consensus is that ISDN's days are numbered.

SCOTT MONTGOMERY

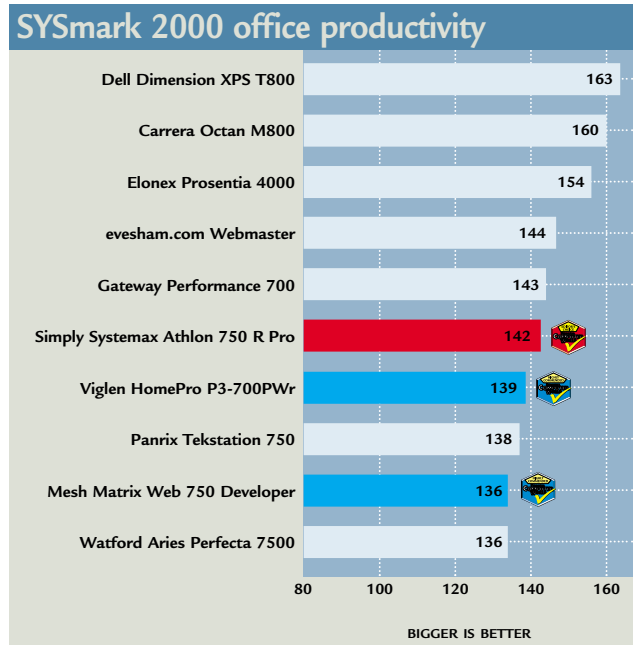
SYSmark 2000 overall



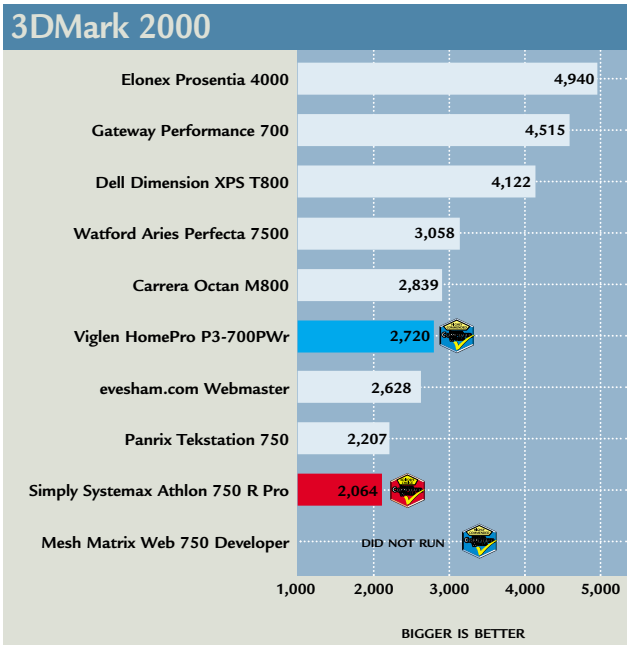
SYSmark 2000 Internet content creation



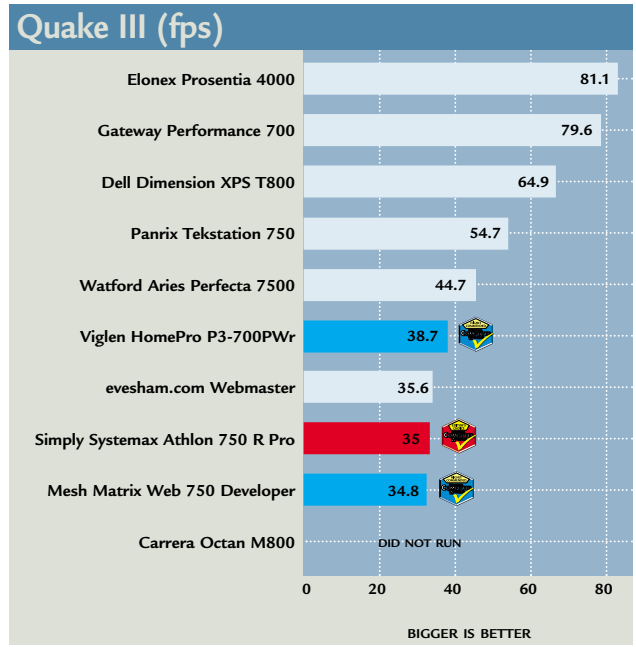
SYSmark 2000 office productivity



3DMark 2000



Quake III (fps)



How we did the tests

SYSmark 2000

This comprises 12 application workloads and a management program. The workloads are divided into two categories: office productivity and Internet content creation. We run the benchmark at a resolution of 1,024 x 768 in 16bit colour. It loops three times, rebooting between each workload.

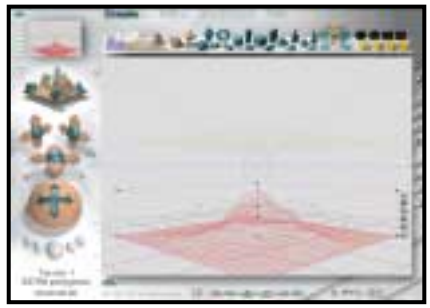
It then assigns the system a performance rating for each application, based on a comparison of workload runtimes between the system being tested and a fixed calibration platform. A rating of 100 indicates the test system has performance equal to that of the calibration platform, 200 indicates twice the performance and so on. The calibration platform is based on a Pentium III 450MHz processor, an Intel 440BX chipset motherboard, 128MB of SDRAM, a 32MB Diamond Viper V770 Ultra graphics card, an IBM DJNA 371800 and Windows 98 SE.

Each category rating is a geometric mean of the workload ratings in that category. The overall rating is a weighted geometric mean of the category ratings.

Office productivity

Corel CorelDraw 9.0
This script first takes an abstract design, applies an Art Stroke to it and runs various filter effects. It creates and manipulates a scene composed of vector graphics. Next, it takes a raster image and applies effects. It creates several 3D objects and performs 3D manipulations.

Corel Paradox 9.0
This performs SQL-style queries on a database table and runs a 'find duplicates' query. It imports other text files, formatting and exporting each to HTML. Then it opens up query forms, enters additional data and produces reports based on queries.



Bryce 4 script manipulates a wire frame scene and renders it

Microsoft Word 2000
This workload invokes word processing functions, including editing, spell checking, search and replace, font change, copy and paste, print preview, mail merge fields, insert hyperlinks, background and table formatting plus opening and viewing HTML pages.

Microsoft Excel 2000
Operations include closing and opening spreadsheets, HTML pages and data in text files, spell checks, formula calculation, plotting data, formatting charts and cells, analysing data in pivot tables, naming a cell and inserting hyperlinks.

Microsoft PowerPoint 2000
Operations include spell checks, editing, formatting and moving pictures, applying templates, formatting tables in slides, inserting hyperlinks, applying header and footer data formatting charts, applying graphics and sound effects, and adding movie files.

Dragon NaturallySpeaking Preferred 4.0
The script plays a pre-recorded WAV file into Naturally-Speaking, which then converts the WAV file to text.

Netscape Communicator 4.61
This opens a website of plays by Shakespeare and selects and loads the texts several times. Then it loads a page consisting of large tables, thumbnails and images and cycles through viewing the images.

Internet content creation

Adobe Premiere 5.1
This creates an animation of about 16 BMP files and other AVI clips and puts transitions between them. It superimposes two audio tracks and runs the audio through filters.

3DMark 2000 tests each system's DirectX performance (above) and OpenGL performance is tested via Quake III: Arena (below)

Adobe Photoshop 5.5
The script loads, resizes, zooms out of images, applies filters to the images, changes mode and colour settings, adjusts image brightness and contrast and saves the image to a JPEG file.

Avid Elastic Reality 3.1
The workload sets up and renders a morph between two MPEG2-sized images (720 x 480 pixels, roughly 750KB).

MetaCreations Bryce 4
This script opens an assembled wire frame scene and renders it to the final image. Then a new image is opened and saved in Metastream format. Another image is opened and saved in an HTML-compatible format.

Microsoft Windows Media Encoder 4.0
The input file is an AVI clip that is encoded using the MPEG-4 Video Codec.

3DMark 2000

Remedy Entertainment's MAX-FX is uesd to test the DirectX performance of a system. It runs two specially coded games at low, medium and high resolutions. We ran the benchmark at 1,024 x 768 in 16bit colour, with each game set to loop three times. The 3DMark is calculated by adding the frames per second for each game together and multiplying the result by 12.

Quake III

We tested each system's OpenGL performance with Quake III: Arena (1.11). The settings were:
video mode – 1,024 × 768,
colour depth – 16bit, full screen, highest texture detail,
texture quality – 16bit,
texture filter – bilinear, lighting and lightmap.
At command prompt we typed:

```
timedemo 1
demo demo001
```

This runs demo 1 and records the frames per second.

Table of features




Manufacturer	Carrera	Dell Computers	Elonex	evesham.com
Model Name	Octan M800	Dell Dimension XPS T800	Prosentia 4000	Webmaster
Price inc VAT (ex VAT)	£1,749 (£1,489)	£1,761 (£1,499)	£1,761 (£1,499)	£1,762.50 (£1,500)
Telephone	020 8307 2800	0870 152 4850	020 8452 4444	0800 038 0800
URL	www.carrera.co.uk	www.dell.co.uk	www.elonex.co.uk	www.evesham.com
Hardware specs				
Processor	AMD Athlon 800MHz	Pentium III 800MHz	Pentium III 700MHz	AMD Athlon 750MHz
RAM/type	256MB PC100	256MB PC100	256MB PC100	256MB PC100
Occupied RAM slots/pare RAM lots	1/2	1/2	2/1	2/1
Max memory in this configuration (without removing existing memory)	768MB	768MB	512MB	512MB
Max memory supported by motherboard	1.5GB	768MB	768MB	768MB
Hard disk (manufacturer & model)	Quantum Fireball	Maxtor DiamondMax Plus 40	Fujitsu Picobird MPE3204AH	DiamondMax 40
HD size/interface	20GB/EIDE	40GB/EIDE	20.4GB/EIDE	30.7GB/EIDE
Storage drive model and manufacturer	Matshita CD-RW CW 7585	Sony CRX140E CDRW	Iomega Zip 250	Samsung combo drive SM-304B
Size of storage drive media/interface	650MB/EIDE	650MB CDR/CDRW/EIDE	250MB/EIDE	650MB/EIDE
Motherboard components				
Motherboard maker/model/chipset	Asus/K7V/VIA KX-133	Dell/Intel/Intel 440BX	MSI/MS6163/Intel ZX	MSI/K7 Pro/AMD 756
Expansion and I/O				
No of 3.5/5.25in bays	3/4	5/2	4/3	2/3
No of free 3.5/5.25in bays	1/2	3/0	2/1	0/2
No of PCI/ISA/shared slots	5/0/0	4/0/1	4/1/1	5/0/1
No of free PCI/ISA/shared slots	3/0/0	2/0/1	1/1/1	3/0/1
No of USB/serial/parallel/PS2	4/2/1/2	2/1/1/2	2/2/1/2	2/2/1/2
Multimedia				
DVD/CD manufacturer/model	Matshita DVD-ROM SR-8585	Samsung DVD-ROM SD-612	Acer	Samsung combo
DVD/CD read-speed/interface	8x DVD/EIDE	12x DVD/EIDE	10x DVD/EIDE	4x DVD/24x CD/EIDE
Sound card manufacturer	Creative	Creative	Creative	Creative
Sound card model	SB Audio PCI 128	SB Live! Value	SB PCI128	SB128
Speakers (manufacturer & model)	Altec Lansing ACS22	Harmon Kardon HK195	Creative SBS20	Creative CSW52
Graphics card maker & model	Matrox G400 DualHead	nVidia GeForce 256	Hercules	Matrox G400 DualHead
Chipset	G400	GeForce	GeForce 256 DDR DVI	G400
RAM/max RAM and type	32MB SGRAM	32MB/32MB/SDRAM	32MB DDR RAM	32MB SGRAM
Graphics card interface	AGP	AGP	AGP	AGP
Monitor manufacturer/model	Iiyama Visionmaster Pro 502	Dell P991	Elonex 19in	1 x 19in Vale & 1 x 17in Vale
Monitor size/max viewable diagonal	21in/19in	19in/17.95in	19in/18in	19in/18in 17in/16in
Maximum resolution and refresh	1,920 x 1,440 @ 75Hz	1,600 x 1,200 @ 85Hz	1,024 x 768 @ 75Hz	1,600 x 1,200 @ 75Hz
Other information				
Modem manufacturer and model	BT Speedway ISDN PCI	Conexant MDP 3900V-W Modem	BT Speedway ISDN	Diamond Supra SST 56i Pro DFV
Misc hardware			Intel Pro/100+ Management Adaptor	
Bundled software	Microsoft FrontPage Express	MS Office 2000 SBE	Dreamweaver 3 Fireworks 3	MGI Photosuite III Platinum HoTMetaL Pro 6.0, F1 Free Internet
Standard warranty	2 years on-site – parts & labour	1 year on-site, 2 years rtb	3 years, first on-site	2 years on-site

	Gateway	Mesh	Panrix	Simply	Viglen	Watford
						
	Performance 700	Matrix Web 750 Developer	Tekstation 750	Systemax Athlon 750 R Pro	HomePro P3-700PWr	Aries Perfecta 7500
	£1,676 (£1,427)	£1,761.33 (£1,499)	£1,643.83 (£1,399)	£1,762.50 (£1,500)	£1,761.33 (£1,499)	£1,762.50 (£1,500)
	0800 552 000	020 8208 4706	01132 444958	08707 297366	020 8758 7000	0800 035 5555
	www.gateway.com/uk	www.meshcomputers.com	www.panrix.com	www.simply.co.uk	www.viglen.co.uk	www.watford.co.uk
	Pentium III 700MHz	AMD Athlon 750MHz	AMD Athlon 750MHz	AMD Athlon 750MHz	Pentium III 700MHz	Pentium III 600MHz
	256MB PC100	128MB PC100	128MB PC100	256MB PC133	256MB PC100	128MB PC133
	1/2	1/2	1/2	2/1	1/2	1/3
	768MB	640MB	640MB	512MB	640MB	896MB
	768MB	768MB	768MB	1.5GB	768MB	1GB
	Western Digital	Western Digital Carviar 205BA	Maxtor DiamondMax 40	Maxtor DiamondMax VL20	IBM Deskstar DPTA-372730	Maxtor DiamondMax+
	20GB/EIDE	20.5GB/EIDE	30.7GB/EIDE	20.4GB/EIDE	27.3 GB/EIDE	40.9GB/EIDE
	Zip 250	Matshita CD-RW CW-7585	Ricoh MP 7080ADP	Ricoh DVD 6, CD 24, CDRW 4	Sony CD-RW CRX140E	Ricoh DVD/CD-RW MP9060
	250MB/EIDE	650MB/EIDE	650MB/EIDE	650MB/EIDE	650MB/EIDE	650MB/EIDE
	Gateway/Intel 440BX	MSI/K7 Pro/AMD 756	Asus/K7V/VIA KX-133	AOpen/AK72/KX133	Viglen OEM/Intel 440BX	Gigabyte/Intel BX
	6/4	4/3	4/3	3/3	4/2	3/3
	4/2	2/1	2/2	1/1	2/0	1/2
	4/0/1	5/0/1	5/0/0	4/0/1	3/2/1	5/0/1
	2/0/0	3/0/1	4/0/0	3/0/1	0/2/0	4/0/0
	2/2/1/2	2/2/1/2	4/2/1/2	4/2/1/2	2/2/1/2	2/2/1/2
	Toshiba DVD-ROM SD-M1402	Pioneer DVD-114	Ricoh MP 7080A	Creative CD5220	Pioneer DVD-ROM DVD-115	Ricoh DVD/CD-RW Combo MP9060
	12x DVD/40x CD/EIDE	10x DVD/40x CD-ROM/EIDE	32x CD/EIDE	52x CD/EIDE	16x DVD/40x CD/EIDE	4x DVD/24x CD/EIDE
	Creative	Creative	Onboard	Onboard	Creative	Videologic
	SB Live! Value	SB PCI 128	N/A	N/A	SB Audio PCI 128	Sonic Vortex 2
	Boston Acoustic BA735	Labtec LCS 1030	Labtek LCS-2414	Creative SBS52	Labtec LCS-2632	Yamaha
	nVidia GeForce DDR	Matrox G400 DualHead	Diamond Viper II Z200	Matrox G400	Matrox G400 DualHead	Matrox G400 DualHead
	GeForce 256	G400	Savage	G400	G400	G400
	32MB DDR	32MB SGRAM	32MB SDRAM	32MB SGRAM	32MB SGRAM	32MB SGRAM
	AGP	AGP	AGP	AGP	AGP	AGP
	Gateway EV910	Mitsubushi Diamond Pro 720	Hansol 900P B19BL	CTX PR960F	ADI MS-E90	CTX PR960F
	19in/18in	17in/16in x 2	19in/18in	19in/18in	19in/18in	19in/18in
	1,600 x 1,200 @ 75Hz	1,600 x 1,200 @ 75Hz	1,600 x 1,200 @ 75Hz	1,600 x 1,200 @ 85MHz	1,920 x 1,440 @ 75Hz	1,600 x 1,200 @ 85Hz
	56K PCI Voice Modem SF-11561V	SupraExpress 56i V Pro	BT Speedway ISDN	ISDN NDISWAN Adaptor	Eicon Diva 2.01 S/T (PCI)	SupraExpress 56i Pro VCC
		Microsoft Internet Keyboard Microsoft IntelliMouse Explorer (Optical)			Diamond modem Supra Pro 56K PCI, Realtek RTL8139 Network Card	MS Internet Keyboard Pro MS Intellimouse Explorer
	Microsoft Works Suite 2000	Dreamweaver 3, Fireworks 3 Flash 4 (trial version only)	Dreamweaver 3 Fireworks 3	Dreamweaver 3, Fireworks 3 MS Office 2000 Pro, Personal Web Server, Netscape	Microsoft Works Suite MS FrontPage 2000	MS FrontPage 2000 MS PhotoDraw 2000 Version 2
	1 year on-site, 2 years rtb	1 year on-site, 2 years rtb – parts & labour	1 year on-site, 2 years rtb	1 year on-site, 3 years rtb	1 year onsite	1 year rtb --parts & labour 5 years rtb labour only

Editor's **Choice**

Although the systems we received this month were varied, the winning machines all hit upon a broadly similar formula, obviously based on a good knowledge of what a customer will want from a machine that's aimed at a specific task. We're heartened by the fact that there are still companies that can respond to a challenge rather than blindly churning out the same old boxes month in, month out.

It's worth repeating that in choosing this month's winning machine, we altered our normal judging criteria. Usually, our group test remit is fairly broad – budget PCs, power PCs or something in between. But in specifically asking for a system to do a particular job, and one that relies not so much on cutting-edge hardware as on software and intelligently chosen peripherals, we've reduced our normal emphasis on performance and the latest hardware.

A 700MHz processor is more than up to the job of running whatever HTML tools or web graphics applications you can throw at it, particularly when the emphasis in web design is on keeping image file sizes as small as possible for fast download: no need for dual processors to allow Photoshop to churn through effects operations on a 40MB TIFF here, although there's never any harm in having as fast a system as you can afford.

Similarly, a pair of speakers that'll blow your socks off and a graphics card capable of 100fps running Quake III at 1,280 x 1,024 is all well and good, but not really what we were after this month.

When you've been sitting up all night staring at your HTML code, or you need to get a particular design job done fast, what you'll really appreciate is a decent high-resolution display setup, plus software that can keep pace with your creativity and allow you to realise your designs as quickly as possible.

For the same reason, the software bundled with each machine on this occasion played an important part in deciding who should receive an award. It was perhaps not surprising that two of the three mentioned below shipped with both Dreamweaver 3 and Fireworks 3 from Macromedia. Those manufacturers that included little or no dedicated web software fared poorly, as might have been expected.

The winners

For these reasons, the **Editor's Choice** award this month goes to the Simply Systemax Athlon 750 R Pro. Basic hardware is taken care of by the 750MHz Athlon and 256MB of PC133 SDRAM, and the 20GB hard drive is perfectly adequate. But it was the combination of the excellent CTX PR960F and, more importantly, the inclusion of Dreamweaver 3, Fireworks 3 and Microsoft Office 2000 Professional Edition that really impressed us the most: these three packages really do give you a system that's ready to rumble as soon as you pull it out of the box.

Systemax didn't have it all its own way this month though: a couple of other systems were snapping at its heels. First to receive our **Highly Commended** accolade is the Mesh Matrix Web 750 Developer system. The excellent-quality dual Mitsubishi monitors will give a genuine productivity boost when you're running multiple apps simultaneously and the smaller 128MB of RAM isn't too much of a disadvantage in this context, unless you're planning to upgrade to Windows 2000, with its memory-hungry NT codebase, in the near future. And again, when you're subjecting yourself to the prolonged sessions in front of your machine you'll appreciate decent input devices, so the Mesh scores here with a good-quality Microsoft Internet keyboard and the excellent optical Intellimouse Explorer.

The final **Highly Commended** goes to Viglen's HomePro P3-700 PWr. The software isn't quite up to the standard of the other two award winners, with Microsoft FrontPage 2000 doing the HTML business, but it's still a good application and is backed up by Microsoft's highly competent Works Suite 2000.

Hardware-wise, the system pretty much has it all, with two 19in monitors, 256MB of RAM, a big 27GB hard disk, 16-speed DVD-ROM, CD-RW drive and a hat-trick on the external connectivity front with network card, ISDN adaptor and 56K modem. In addition, you get one of those silver optical rodents and Internet keyboard. Finally, the good-quality three-speaker Labtec setup, while not strictly necessary, will do for those moments when you just can't resist a quick go on Unreal Tournament via your ISDN connection.

Simply's PC had a great monitor plus Dreamweaver3 and Fireworks 3

Mesh Matrix Web 750 Developer boosts productivity when running multiple apps

Viglen's HomePro P3-700 PWr inlcuded two 19in monitors in its winning package

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• DVDs reviewed by Riyad Emeran and tested by Lars-Goran Nilsson

ratings

★★★★★ **EXCELLENT**
★★★★ **VERY GOOD**
★★★ **AVERAGE**
★★ **BELOW AVERAGE**
★ **POOR**

Discover DVDs

DVD-ROMs are standard fare on new PCs these days but deciding which one to buy can be daunting. We've tested 12 of the best, including some with CD-RW features, to help you make your choice.

PHOTOGRAPH PATRICK LLEWELYN-DAVIES

The chances of buying a PC these days without a DVD-ROM drive are pretty slim. It seems that even budget PCs ship with DVD as standard, indicating that DVD-ROM has become the *de facto* standard optical drive.

The transition from CD-ROM to DVD-ROM has been a lot less painless than the transition from floppy disk to CD-ROM. This is mainly because when the CD-ROM drive arrived, the lack of supporting software made the drive an expensive and somewhat useless addition to a PC. However, since a DVD-ROM can also read CD-ROM software and play DVD movies, it is an instantly useful piece of equipment, even if there isn't a lot of DVD-specific software available yet.

There's not a lot to separate DVD-ROM drives from one another other than performance. Testing aspects such as DVD movie playback is completely bogus, since that's down to the graphics card or MPEG2 decoder.

Several of the drives featured in this group test are DVD/CD-RW combo units, but we have only tested the DVD and CD read performance and looked at the CD-RW capability as a bonus.

What most users are looking for is a drive that will transfer data fast enough to ensure that they're not left twiddling their thumbs for too long.

To this end, we've rounded up 12 DVD-ROM drives, including some with CD-RW capability, and run them through a rigorous set of real-world tests.

AOpen DVD 1640 Pro

DVD-ROM

AOPEN HAS BECOME a force to be reckoned with of late, producing components and peripherals in every area of PC construction.

The DVD 1640 Pro is the fastest drive on test, spinning DVDs at a very impressive 16-speed and CDs at 40-speed, producing some lightning fast times. It managed to speed through the massive 2.3GB Baldur's Gate install in only three minutes 56 seconds, while copying the Encarta DVD-ROM took only six minutes 11 seconds. Only the copy of the MPEG file fazed the 1640, but it still turned in a respectable time.

The drive itself is a slot-loading unit, whether you prefer this to a tray loader is a matter of opinion, but the idea is that there is less dust ingress and fewer moving parts to go wrong.

On the front is a single eject button along with a headphone jack and volume wheel. In the retail box you'll find a manual, a driver disc and an audio cable. It lacks an EIDE cable, but you do get a full copy of Cyberlink's excellent Power DVD movie player.

Ultimately, AOpen has produced a first-class unit that marries excellent performance with solid build quality. It's a close call between this drive and the Pioneer, but the DVD 1640 Pro just loses out due to its higher price.

DETAILS

★★★★★

PRICE £128.07 (£109 ex VAT)
CONTACT Jungle.com 0800 0355 355
www.aopen.nl
PROS Very fast; well built
CONS Slightly more expensive than the Pioneer
OVERALL The fastest DVD drive available, with smart design and solid build quality

Asus E612

DVD-ROM

LIKE AOPEN, ASUS has built a very strong reputation for itself over the past few years, both as a motherboard manufacturer and for its expansion into areas such as optical drives.

The E612 is a 12-speed unit, so it's not quite cutting edge. The model we looked at was an early sample and refused to read CD-R media – presumably this is an issue that will be resolved in the production version.

Performance was a very mixed bag. The E612 managed to copy the Encarta disc in a reasonable time, although still slightly slower than the other two 12-speed drives. However, when it came to the Baldur's Gate installation, the Asus turned in a score of 13 minutes 32 seconds, which was on a par with the four-speed combo drives and slower than the five-speed Toshiba DVD-ROM.

On the plus side, the front panel is more comprehensive than most of the other DVD-ROM drives; featuring CD audio controls for play/skip and stop/eject as well as the headphone jack, volume wheel and indicator light.

On the surface this looks like a disappointing effort from Asus, but hopefully the performance and compatibility issues will be addressed by the time the production models ship.

DETAILS

★★

PRICE £116.32 (£99 ex VAT)
CONTACT Landmarq 020 8768 9301
www.asus.com.tw
PROS CD control buttons on the front panel
CONS Poor performance and compatibility
OVERALL The performance and compatibility issues should be addressed by the time you read this, but it's still only a 12-speed

LG Electronics DRD 8080B

DVD-ROM

THIS DRIVE FROM LG Electronics is looking a little bit behind the times in terms of specification. The 8080B will spin DVDs at eight-speed and CDs at 40-speed. Considering that we have two 16-speed drives in this test, the LG was never going to win any prizes for speed. Unfortunately, performance wasn't the only problem that the 8080B encountered. After numerous tries we could not get the LG to perform the install of Baldur's Gate. Considering that software installations should be the staple diet for a DVD-ROM drive, we were not very impressed.

The copy of the Encarta disc went without a hitch, but as expected the performance was poor, with only the five-speed SCSI Toshiba drive turning in a slower score. The CD-ROM performance proved to be far better with the 8080B turning in the third fastest score for the MPEG copy.

The front of the unit is rather sparse with a very small eject button, a headphone jack and a volume wheel, while the array of ports at the rear includes a digital audio output port.

It's hard to recommend the LG when there are much faster drives available that performed all the tests faultlessly.

DETAILS

★★

PRICE £116.32 (£99 ex VAT)
CONTACT Dabs.com 0800 129 3120
www.lge.com
PROS Good retail kit and documentation; good MPEG2 playback software
CONS Slow and outdated; it wouldn't run all the tests
OVERALL A disappointing drive; the specs are below par and the performance is poor

Pioneer DVD-115

DVD-ROM

PIONEER HAS LIVED up to its name in the home DVD player market, producing some of the first and, some would say, best units. Although Pioneer was slow to hit the DVD-ROM market, it managed to come up with a 10-speed drive while the competition was still producing six and eight-speed models. Now Pioneer has come up with a 16-speed drive,researched in alliance with AOpen, making it one of only two drives available at this speed. Unfortunately for Pioneer, the AOpen unit was marginally faster.

Unlike the AOpen drive, the Pioneer uses the traditional tray loading design. At the rear Pioneer has been considerate enough to supply a jumper with a small handle to allow easy slave/master selection, without the need for tweezers, something that the AOpen drive also sports. Performance wise, there was only a whisker's difference between the Pioneer and AOpen units on DVD read performance, while CD read performance was identical across both drives.

The DVD-115 is a very fast unit and the few seconds' difference in speed between this and the AOpen are negligible. If you're after a fast drive you'll be happy with either, but the Pioneer just steals the Editor's Choice award due to its lower price.

DETAILS

★★★★★

PRICE £116.32 (£99 ex VAT)
CONTACT Dabs.com 0800 129 3120
www.pioneer.co.uk
PROS Very fast with a reasonable price
CONS Just a whisker slower than the AOpen
OVERALL A great drive. If you're after speed you'll love the Pioneer

Samsung SD-612

DVD-ROM

LIKE LG, SAMSUNG is a Korean company that produces a wide range of products in both the IT and consumer electronics arenas. Although a relatively large player in the CD-ROM market, Samsung has only just targeted the DVD-ROM market with serious intent, and the SD-612 isn't a bad start.

The SD-612 provides 12-speed performance for DVDs and 40-speed performance for CDs. The performance results were favourable for the drive, with it turning in a time of six minutes 27 seconds for the Baldur's Gate install and eight minutes 50 seconds for the Encarta copy. What was most impressive though, was the MPEG file copy from CD which took only three minutes 22 seconds.

The drive itself feels very solid and there's a full complement of ports at the rear, including a digital audio output. At the front you've got an eject button, indicator light, headphone jack and volume wheel. Like most of the DVD-ROM drives, the SD-612 has a 512KB data buffer for smooth transfer.

With the unit you get a driver disc and a CD audio cable for listening to audio CDs through your sound card.

All in all, the SD-612 is a decent unit, providing a good performance for a 12-speed device.

DETAILS

★★★★

PRICE £116.32 (£99 ex VAT)
CONTACT Samsung
www.samsung-storage.com
PROS Solid performance
CONS Not as fast as the 16-speeds
OVERALL A very good 12-speed drive, worth a look if you can't find the AOpen or Pioneer

Toshiba SD-M1201

DVD-ROM

THIS IS THE ONLY SCSI DVD-ROM drive on test, so you could say that Toshiba has got the market sewn up. This is a surprising situation since there are a great many SCSI users out there and they aren't likely to want to turn on an EIDE channel just to be able to use a DVD-ROM drive.

It's no surprise to see Toshiba producing this kind of unit, since the company also used to produce good SCSI CD-ROM drives. What is strange, however, is that Plextor, the leader in high-end SCSI CD-ROM drives, has not produced a competing unit yet.

Strangely, even though the SCSI bus has more bandwidth and causes less system overhead, Toshiba has chosen to make this drive only a five-speed unit with corresponding 32-speed CD-ROM performance. With this specification, it's unsurprising that the SD-M1201 didn't score too favourably in the tests. The copy of the Encarta DVD took 16 minutes 38 seconds, while the Baldur's Gate install was just a couple of seconds shy of 10 minutes. Bizarrely, it was slightly faster than the two 16-speed units when copying the MPEG file.

The SD-M1201 may not be the fastest drive on test or the most advanced, but if you want a SCSI-only PC, it could be your only option.

DETAILS

★★★

PRICE £103.04 (£88 ex VAT)
CONTACT SMCdirect 01753 550 333
www.toshiba.co.uk
PROS SCSI interface; very cheap
CONS Not very fast
OVERALL If you want a SCSI DVD-ROM drive, this is it. But at least it's cheap

Toshiba SD-M1402

DVD-ROM

TOSHIBA WAS ONE of the first manufacturers to produce a DVD-ROM drive. The SD-M1402 provides 12-speed DVD performance and 40-speed CD performance.

The SD-M1402 managed to beat the Samsung 12-speed drive by over a minute when copying the Encarta CD. However, it only managed a time of eight minutes 37 seconds when copying the MPEG file, compared to three minutes 22 seconds on the Samsung. One reason for this could be the relatively small data buffer of 128KB, which could cause a bottleneck when transferring large amounts of sequential data. The other tests proved similar across the 12-speed devices.

The most obvious omission on this drive is the lack of a headphone jack and volume wheel. That means that you must have a sound card in your PC if you want to listen to music. The only features on the front fascia are the eject button and the indicator light.

The build quality of the SD-M1402 is first rate, with the case feeling more solid than the other drives on test. But this does not really make up for the lack of features as fundamental as a headphone jack and volume wheel.

DETAILS

★★★

PRICE £129.25 (£110 ex VAT)
CONTACT SMCdirect 01753 550 333
www.toshiba.co.uk
PROS Decent performer; excellent build quality
CONS No headphone jack or volume wheel; faster drives available
OVERALL Not a bad unit, but if you want a 12-speed drive, the Samsung is a better bet

AOpen DRW 4624

DVD-ROM/CD-RW

AOPEN MAY HAVE produced some of the fastest test scores with its 16-speed DVD-ROM drive, but it's also managed to turn in the slowest score with the DRW 4624 DVD/CD-R combo drive.

Although we expected these drives to be considerably slower than the DVD-ROM drives, we were surprised to see the 4624 fall just one second short of 33 minutes, when copying the Encarta DVD. Strangely, it was only in this particular test that the AOpen scored so badly; across the other tests it was on a par with the other combo drives.

The rear of the unit has all the ports that you would expect, while the front has an eject button, indicator light, headphone jack and volume wheel.

Unlike AOpen's DVD-ROM drive, this unit ships with WinDVD, for MPEG2 playback. You also get the excellent Nero Burning ROM for CD-R mastering and InCD for packet writing to CD-RW discs. Thoughtfully, AOpen has also included a copy of Norton Ghost so that you can image your hard disk to CD-R or CD-RW.

There's an audio cable included, but no EIDE cable, which is a little disappointing. That said, AOpen has put together a strong package with a decent software bundle.

DETAILS

★★★

PRICE £257.32 (£219 ex VAT)
CONTACT Jungle.com 0800 0355 355
www.aopen.nl
PROS Good software bundle
CONS Disappointing performance when copying from DVD media
OVERALL Not a bad drive, but there are better combo units around

Memorex TriMAXX 200

DVD-ROM/CD-RW

THIS DRIVE FROM Memorex is actually a re-badged Ricoh unit even though it performed better than the Ricoh itself. Strange as this may seem, it's not that uncommon and could be the result of something as simple as firmware differences.

Like the other combo drives on test, the Memorex boasts read speeds of four-speed and 24-speed for DVD and CD media respectively. It also writes CD-RW media at four-speed and CD-R media at six-speed.

Similarities aside, the Memorex was a very good performer, consistently ranking as the fastest combo drive, or at least near the top. The Baldur's Gate installation took only 12 minutes 34 seconds, while it made the MPEG copy in only seven minutes 46 seconds, beating many of the DVD-ROM drives.

Even though we're not testing the CD-RW performance in this test, the fact that the Memorex and Ricoh can write CD-R media at six-speed gives them an advantage over the Toshiba and Samsung. Although its importance relies on how often you'll be burning CDs.

Cosmetically, this drive is identical to the Ricoh. But it's a great drive that's fast in all areas. Add to this an attractive price and you've got a deserving Editor's Choice winner.

DETAILS

★★★★★

PRICE £199 (£169.36 ex VAT)
CONTACT PC World 08705 464 464
www.memorex.co.uk
PROS Very fast for a combo unit; six-speed CD-R performance; good price
CONS None
OVERALL This is the best of the combo drives

Ricoh 9060A

DVD-ROM/CD-RW

RICOH WALKED AWAY with a Highly Commended award in our June CD-RW group test with this very unit. What Ricoh had done was combine decent CD-RW performance with DVD-ROM functionality. This time, however, we're more interested in its DVD capabilities.

The 9060A's spec is identical to the Memorex, which isn't surprising since they're basically the same drive. You get four-speed DVD and 24-speed CD read performance, coupled with six-speed CD-R and four-speed CD-RW writing.

The copy of the Encarta disc took 26 minutes 32 seconds, which was a couple of minutes slower than the Memorex and the Samsung, but still a fair bit faster than the AOpen. The other scores were similarly nothing to write home about, but they weren't far off the mark.

The retail box is a good package including media, an audio cable and Nero Burning ROM for CD-R writing and InCD for CD-RW use.

It's easy to judge the Ricoh harshly due to its scores, but it's not far behind the pack and it does have one very impressive redeeming feature, its price. Costing only £165 ex VAT, the Ricoh offers amazing value, making it a great combo buy.

DETAILS

★★★★

PRICE £193.87 (£165 ex VAT)
CONTACT Dabs.com 0800 129 3120
www.ricoh-europe.com
PROS Great value; six-speed CD-R performance
CONS Not the fastest performer in the test
OVERALL This drive has a great spec, but the identical Memorex performed better in tests

Samsung SM-304B

DVD-ROM/CD-RW

SAMSUNG IS DEFINITELY proving that it's serious about DVD, submitting drives in both the DVD-ROM and combo categories.

The SM-304B shares the same specs as the Toshiba drive, offering four-speed DVD and 24-speed CD read performance, while writing CD-R and CD-RW media at four-speed.

Performance was middle of the road with the SM-304B, it failed to either impress or disappoint us. Ultimately, you're making a compromise with a combo drive and a drop in performance over two standalone units is one of the prices you pay.

The unit itself is solid enough and the front panel sports the usual array of controls including an eject button, indicator light, volume wheel and headphone jack. All the necessary ports are at the back, including a digital audio out connector. The package also includes an analog audio cable along with Adaptec's Easy CD Creator for burning CD-R discs and Direct CD for packet writing to CD-RW media.

The SM-304B is a decent unit with performance that's unlikely to disappoint. The price is also reasonable, so if you're happy with the four-speed CD-R performance, it's worth a look.

DETAILS

★★★★

PRICE £199 (£169.36 ex VAT)
CONTACT Evesham.com 0800 038 0800
www.samsung-storage.com
PROS Decent software; reasonable performance; good value
CONS Only four-speed CD-R performance
OVERALL This is a very good product, with a decent software bundle to back it up

Toshiba SD-R1002

DVD-ROM/CD-RW

WE LOOKED AT this combo drive from Toshiba a couple of months ago in the CD-RW group test. In that test it didn't fare as well as the drive from Ricoh, although this time we're looking at DVD and CD read performance.

A full complement of ports reside at the back, including digital audio out. while the front sports the usual headphone jack, volume wheel, indicator light and eject button.

The SD-R1002 managed to turn in the best score of all the combo drives in the Encarta copy test, producing a time of 22 minutes 49 seconds. It was also the second fastest combo drive in the Baldur's Gate test, finishing the 2.3GB installation in 13 minutes 45 seconds. The Memorex sneaks ahead in a few of the tests, but the Toshiba can hold its head high among the combo fraternity.

The software bundle includes a copy of WinDVD for movie playback and InstantCD for burning CD-R discs.

What's most impressive though is that this is the only drive on test that ships with an EIDE cable as standard, as well as an audio cable.

Toshiba has squeezed decent DVD performance from this drive, unfortunately the price is very high.

DETAILS

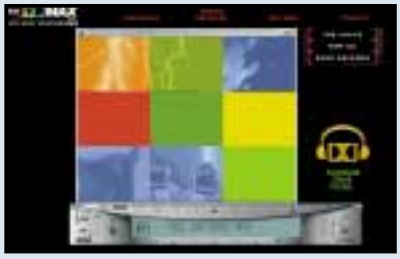
★★★

PRICE £280.83 (£239 ex VAT)
CONTACT SMCdirect 01753 550 333
www.toshiba.co.uk
PROS Fast DVD performance; good bundle including EIDE cable
CONS CD-RW performance doesn't match the DVD performance; high price
OVERALL If you're after for a DVD-ROM drive with the bonus of a CD-RW, this is a great unit

Software DVD players put to the test

Anyone with a domestic player will already know the joys of inserting a DVD movie, then sitting back and enjoying a picture that's far superior to VHS and even LaserDisc. Watching DVD movies on your PC, however, can be a different matter. You may have a DVD-ROM drive and modern operating system that can access the contents of the discs, but what are you going to do about decoding the highly compressed video and audio bitstreams, along with actually navigating the title in the first place?

There are two solutions for decoding DVD movies on a PC: one uses software and the other uses hardware.



SoftDVD produced almost fautless results

A hardware decoder card employs essentially the same chips that are used in a domestic DVD player to decompress the video into something you can see on your monitor or TV set. Creative Labs' DXR3 and Videologic's DVD player are two such PCI cards, that cost around £75.

Software decoders are small applications that harness the processing muscle of modern PCs to navigate, decode and display DVD movies on your monitor. Even the fastest PIIIs can struggle with the load of decoding DVDs using a software player, but help is at hand. Most graphics cards designed in the past year boast built-in motion compensation, which takes care of decoding most of the video bitstream, removing much of the strain from your CPU.

While we could easily leave it at that, we wondered whether all motion compensation was created equal – ATi, for instance, is always claiming it has the best support for DVD. So we took four different graphics cards and tried them out on the same system, using any supplied software, along with MGI's SoftDVD MAX (£14 to download) and InterVideo WinDVD (supplied with several graphics cards as well as with Creative's Live sound cards). We wanted to measure the CPU workload on each card, so fired up the System Monitor accessory in Windows 98 under each configuration.

The test system consisted of an FC-PGA Pentium III 600E CPU with 128MB of SDRAM, an AOpen DVD-ROM drive and a 13.6GB Quantum Fireball Plus KX UltraDMA/66 hard disk, fitted on a Gigabyte GA-6BX7+ motherboard. The Windows 98 SE system was set up for stereo output using a Creative Labs SoundBlaster Live! Platinum card, with the desktop running at 1,024 x 768 in 16bit colour. Our AGP graphics card candidates were an ATi Rage Fury MAXX, Asus AGP-V3800/32M TNT-2 Ultra, Abit Siluro GeForce 256 SDR, and a Matrox Millennium G400. We measured the CPU hit when playing chapter 29 of *The Matrix* (Region 1), where Keanu Reeves and Carrie-Anne Moss shoot up the reception of a high-security building.

The results were revealing. Using MGI SoftDVD MAX, the CPU hit bounced up and down between 20 and 85 per cent, but apart from a slightly lower hit on the ATi card, the other three achieved similar scores. In terms of quality, MGI's software player was almost faultless, albeit suffering from very occasional jerkiness.

In comparison, InterVideo WinDVD consumed a much more even supply of CPU power, with typically no more than 15 per cent variation. The Matrox G400 and Abit Siluro both averaged a 65 per cent hit, while the Asus scored a slightly better average of 60 per cent. The winner, however, in terms of CPU hit using WinDVD and especially its own supplied player was ATi, with an average of just over 50 per cent. WinDVD on all cards and the ATi player on the MAXX both delivered very smooth image.

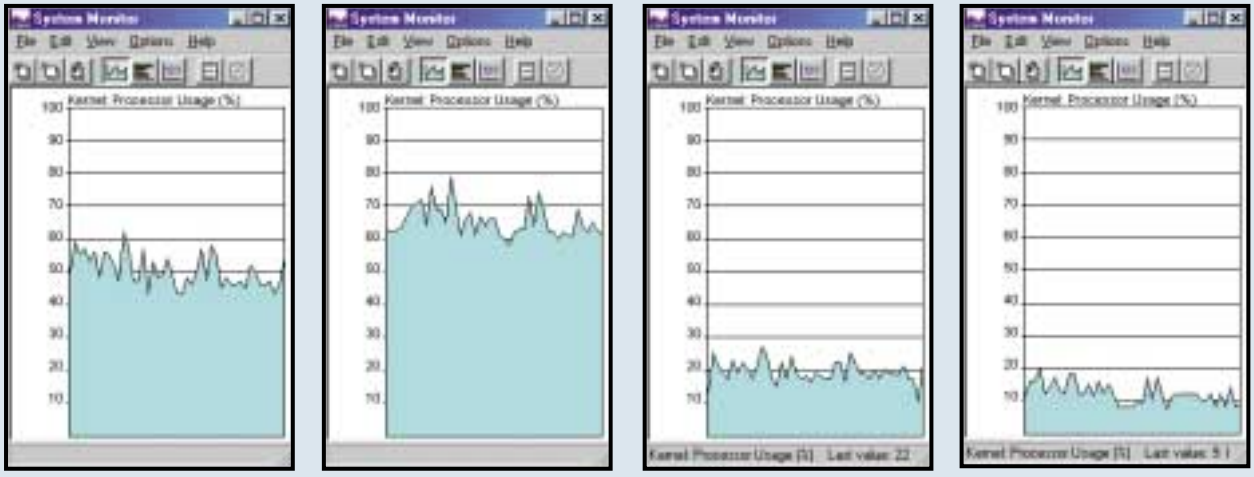
Out of interest we fitted a Creative Labs DXR3 hardware decoder card and ran the tests again using the Matrox G400 card. Using Creative's supplied software, we measured an average of 20 per cent, compared to the software average of 60 per cent on the same system. Just for fun, we replaced the 600MHz PIII with an 866MHz PIII and measured the Matrox G400 CPU hit under WinDVD. This time, the peak dropped from 80 to 20 per cent, and the average from around 65 to 13 per cent. Both the hardware player under 600MHz, and the software player under 866MHz produced faultless playback.

WinDVD gave an even CPU hit

Motion compensation works and is an adequate solution under a 600MHz PIII. ATi proved its claims to be true and delivered the best software results, but for the ultimate in DVD playback, you're still looking at a faster main CPU or a hardware decoder.

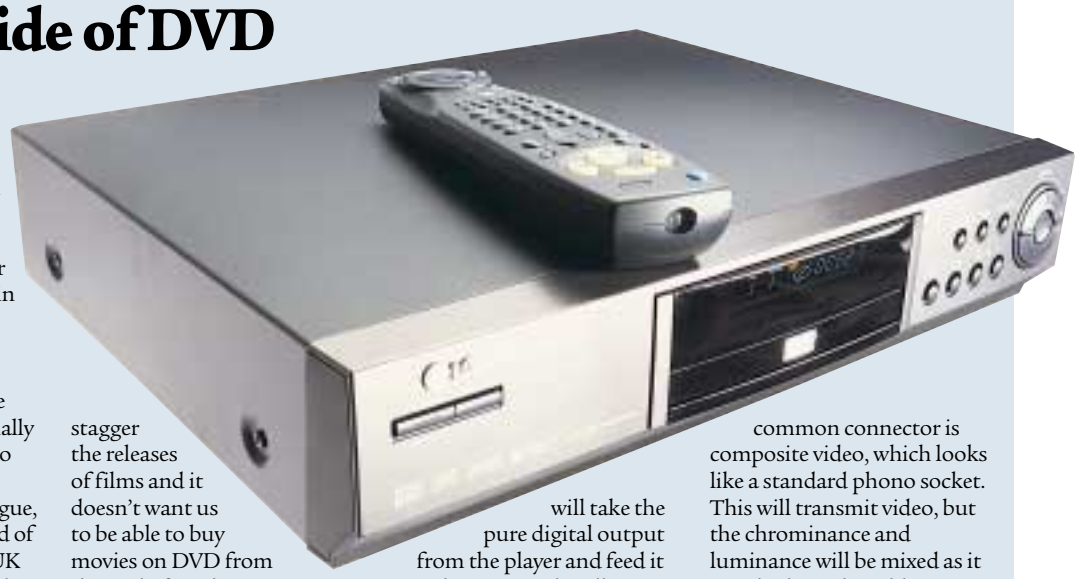
GORDON LAING

MGI: www.mgisoft.com
InterVideo: www.intervideoinc.com



From left to right: the same DVD sequence played on the ATi Rage Fury MAXX and its own player running on a 600MHz PIII, the Matrox G400 and WinDVD on a 600MHz PIII, Creative Labs' DXR3 hardware card on a 600MHz PIII, and finally the Matrox G400 and WinDVD on an 866MHz PIII. In each case, Windows 98's System Monitor measures the CPU workload – smaller is better

The flip side of DVD



DVD-ROM drives are only half the story and, to a degree, the lesser half of the story. Although data storage and distribution were always meant to be a major driving force for the DVD medium, the main use so far has been in the entertainment arena.

DVD-Video has finally taken off in a big way in the UK after a shaky start. Initially the UK software was slow to appear and disappointing compared to the US catalogue, but that has been addressed of late and now we're seeing UK DVD releases appearing only a couple of weeks after their US counterparts.

Unsurprisingly, as a result of the increased software availability, the uptake of standalone DVD-Video players has increased greatly. Also, the cost of a DVD player has dropped so much, that it's no longer prohibitive to mass consumption.

However, as with most things, you do get what you pay for and the type of performance you get from a £199 DVD player isn't going to match that of an £800 player. However, the difference in quality between various ranges of equipment may be imperceptible to most people.

Whatever end of the price spectrum you are going for, there are a few things you need to consider when buying a DVD player. The most important is regional coding. The DVD forum has split the world into regions, with the US and Canada making up Region 1 and Europe and Japan making up Region 2. This has been done because Hollywood wants to be able to stagger the releases of films and it doesn't want us to be able to buy movies on DVD from the US before they're released at the cinema in the UK. Of course, for a lot of people, myself included, being able to obtain films from the US very early is appealing, not to mention that the US discs still tend to have more extra features than the Region 2 UK equivalents. Although officially, you're not supposed to be able to buy a DVD player that plays more than one Region of discs, they are freely available from the right sources. In fact, some retailers will even sell you a chip to make your player multi-region, but you'll need to be pretty handy with a soldering iron to fit one. However, fitting the modification yourself will invalidate your warranty, whereas most shops that sell multi-region machines will warranty the devices themselves, even if the manufacturers won't.

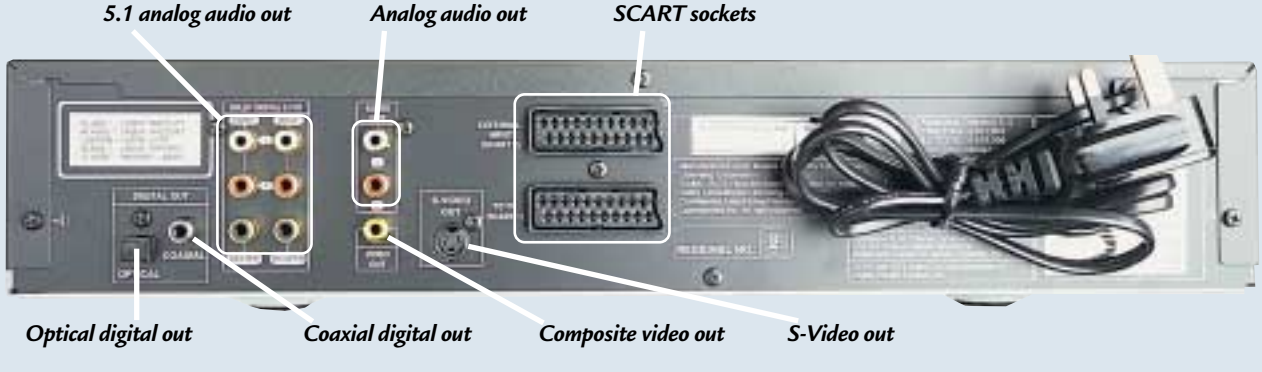
The next thing to consider is whether you want a Dolby Digital Processor built into the player. Now, real home cinema enthusiasts will never use an integrated Dolby Digital Processor, instead they will take the pure digital output from the player and feed it into their external Dolby Digital Processor or amplifier. That said, even if you use an internal processor, you'll still need an amplifier with five analog inputs to receive the signal. Also, deciding to get the best from the sound will require you to fill your room with speakers, so the decision is one of practicality and aesthetics as well as movie enjoyment.

If you have a Dolby Digital or DTS amplifier, you'll want to check what kind of digital outputs a player has. Most decent models will have both optical and coaxial digital outputs, but some budget models may have only one.

The sound is only part of the DVD experience. The picture quality is also first rate, but how good this looks can depend on how you connect the player to your TV. There are several ways to connect a DVD player to your TV. The most common is the SCART connector which carries video and audio. SCART is unique to Europe and allows a one-stop solution for AV connection. Another common connector is composite video, which looks like a standard phono socket. This will transmit video, but the chrominance and luminance will be mixed as it travels along the cable, resulting in picture degradation. A better solution is S-Video which looks like a small DIN socket. S-Video splits the chrominance and luminance as it travels along the cable, producing a far cleaner picture. The video can also be transmitted as discrete RGB along a SCART cable. This also gives a far superior picture to composite video. It is important to find out what connectors your TV has. The chances are that you'll find a couple of SCART sockets on your TV with one wired for S-Video and one for RGB. Older or cheaper TVs may only have a SCART socket that accepts composite video, which narrows your options a bit. While really old TVs may have no AV inputs at all, so make sure that your TV is up to the job before you set your heart on a DVD player.

All this aside, no matter how you connect a DVD player up, the improvements you'll see over VHS will be huge. So, if you're a movie fan, what are you waiting for?

RIYAD EMERAN



Movie surround sound

We can thank the invention or rather threat of television for most of the major cinematic technical innovations of recent decades, including widescreen and surround sound.

Dolby, then known almost exclusively for noise reduction systems, came up with its Dolby Stereo standard, widely used on cinematic releases from 1977 – indeed, *Star Wars* was one of the first films to aggressively use a Dolby Stereo soundtrack. Unlike stereo sound in the home which employs two channels of audio, Dolby Stereo in the cinema was at first a four-channel system.

The first two channels delivered sound to the conventional front speakers, usually located in the left and right corners on either side of the screen. The third channel was used to drive a centre speaker located behind the middle of the 'acoustically transparent' cinema screen. The idea of a centre channel was to solve the problem of ensuring some sounds always appeared to come from the middle of the screen, regardless of where you were sat in the auditorium. Finally the fourth channel contained surround sound effects, and was shared between an array of speakers fitted in a U shape round the rear sides and back wall of the cinema.

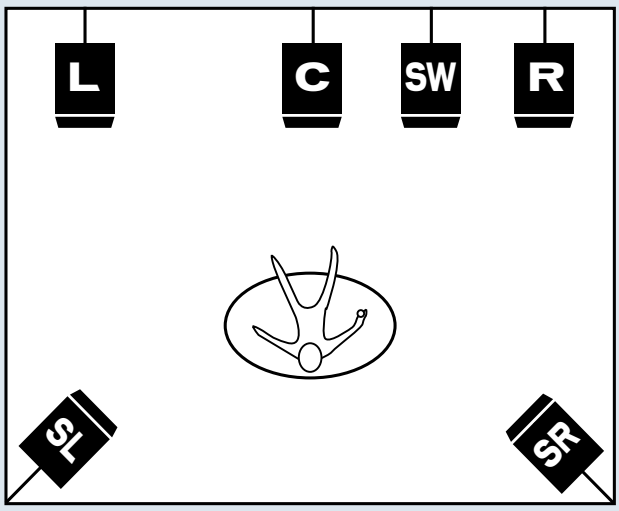
In the cinema, Dolby Stereo delivered its four channels of audio as separate tracks alongside each other on magnetic strips or optical film, normally located on the edge of the actual film itself. Dolby, however, had a more cunning plan for delivering soundtracks to installations with varying numbers of speakers.

The matrix

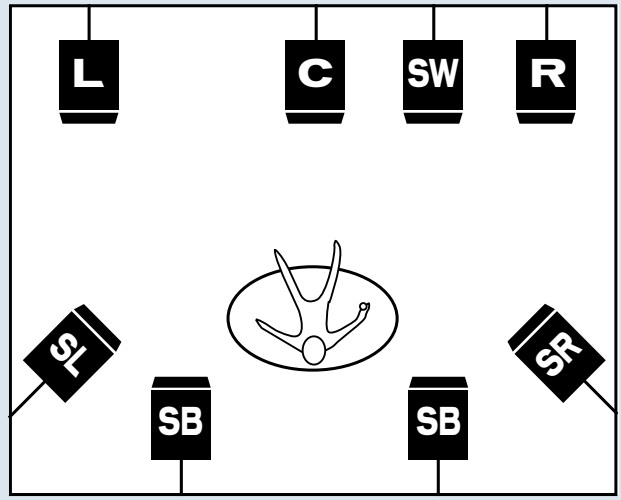
By cleverly recording some channels out of phase with the others, Dolby discovered it was possible to encode four channels of sound into just two. Called matrix encoding, it offered two huge advantages of delivery and compatibility required for the home environment. First, there were plenty of two-channel stereo devices in the home which could quite easily deliver two-channel matrix sound instead, such as TV, VCR and LaserDisc. Second, the actual two-channel matrix-encoded soundtrack sounded fine when played on a conventional stereo system. Best of all, though, the two channel output from the stereo player could be fed into a matrix decoder to extract the original four channels of sound.

Dolby Surround

The first home matrix decoders extracted the surround channel, but did nothing about the original centre channel. These were labelled as Dolby Surround in the home. Considerably superior was Dolby ProLogic, which not only reinstated all four original channels, but also employed steering logic to better direct sounds to their desired locations.



A standard 5.1 channel surround system



THX surround EX includes rear centre effects channels

While Dolby ProLogic became the *de facto* standard for analog surround sound systems in the home, it suffered from several limitations. By converting four channels into two, then back to four again, the centre and especially surround channels became compromised. The centre was not as well defined as it should be, and the surround was restricted to a limited range of frequencies, not to mention being effectively shared between a pair of rear speakers.

Be discrete

By the late Eighties, most major blockbusters were being digitally recorded and mixed in no fewer than five full range, full frequency channels: left, right and centre at the front and separate left and right at the rear. While each of these five digital channels was fully capable of delivering extreme dynamics and deep bass, a separate channel was also dedicated to low frequency effects only. Such a system was named 5.1, for the five full range channels and the single sub-woofer deep bass channel. Since each channel was entirely independent from the others, it was also described as being a discrete system. The only problem was how to get this complex 5.1 digital soundtrack out of the Hollywood recording studio and into our cinemas and homes.

Dolby Digital

Compression was, of course, the answer to delivering huge 5.1 digital movie soundtracks, where each original channel was essentially the same quality as an audio CD. Dolby decided to employ an algorithm known as AC-3 for taking the original 5.1 channels, compressing, then encoding them into a single digital bitstream. Naturally called Dolby Digital, the AC-3 system was set to deliver an encoded 5.1 bitstream typically measuring between 384 and 448Kbits/sec. Not bad when you consider uncompressed two-channel CD audio measures near 1,500Kbits/sec.

The first movie to use Dolby Digital was *Batman Returns*, and at the time it was described in the cinema as Dolby Stereo Spectral Recording Digital. Several confusing name changes later, and Dolby Digital is now known in the cinema simply as Dolby

Alternatives

Dolby Digital is just one way to deliver 5.1 audio. Digital Theatre Systems (DTS), believes it has a better system which uses considerably less

compression and supposedly superior encoding algorithms. The DTS bitstream typically measures between 768 and 1,536Kbits/sec. The first movie to employ DTS was *Jurassic Park*. Sony also has its own discrete sound system called SDDS, although this normally employs more than 5.1 channels, and is so far only used theatrically. The Motion Pictures Expert Group (MPEG) too has many encoding systems for delivering multi-channel audio, but generally to a home environment only.

It's important to note that Dolby Digital, DTS, SDDS and MPEG audio can be used to deliver a number of channels from mono up to 5.1 and in some cases beyond. Also note that for compatibility, most theatrical releases are available in Dolby, DTS and SDDS, and it's up to the cinema owner which version they show.

THX

Lucasfilm's THX is an often recognised logo in the cinema, and indeed on many home components, but it isn't a standard in the same way as Dolby. THX was originally conceived to be a quality control standard for a number of components, from amplifiers to speakers, and movie media to entire cinema installations. Lucasfilm devised minimum requirements for each, and if met (along with subscribing to a lucrative licensing scheme), the owner or manufacturer could use the elite THX badge.

Lucasfilm also had ideas about surround sound though, and in the early days believed that the sound from behind should be diffuse. Consequently, surround sound decoders with THX processing (for cinema or home) would somewhat blur the rear channel into a diffuse field of sound; so-called THX rear speakers employing dipoles were in fact designed to direct sound at anywhere but the listener. While the THX program is undeniably responsible for upping the ante in terms of movie sound, the actual use of a diffuse rear is very much one of personal preference. Most processors labelled as THX allow you to turn it off if you prefer a more direct approach.

Precisely behind you!

Lucasfilm and Dolby haven't rested, however, and recently jointly developed an extension to conventional 5.1 audio. Known as Dolby Digital EX in the cinema, or THX Surround EX in the home, it introduces a sixth discrete channel in the mix for a rear centre channel. Mirroring the front centre, it allows sound mixers to precisely position sounds directly behind the listener regardless of where they're sat, and is great for aircraft or spaceship fly-overs. The first movie to use EX was *Star Wars Episode I*, but other titles since include *Austin Powers 2*, *Fight Club*, *The Haunting*, *Toy Story 2*, and *The World is not Enough*.

New 6.1 algorithms would, however, be incompatible with existing 5.1 systems, so Dolby and Lucasfilm drew on an old and trusted solution: analog matrix encoding. An EX decoder is nothing more than a 5.1 digital decoder, with analog ProLogic applied to the decoded rear left and rear right channels. The result is a new centre channel, and of course, if desired an additional 'rear-surround' channel. Currently movies are not being mixed to deliver information to this ProLogic rear-surround channel, but it could be used in the future.

Some of the very latest THX Ultra home decoders support EX, but experimenters could try connecting a conventional ProLogic processor to the analog stereo rear outputs from their 5.1 decoders, and only using the 'front' three outputs to drive their existing pair of rear speakers and a new centre rear speaker.

What you need

The essentials of any surround sound system are five amplifiers and speakers, preferably as similar as possible. You'll also need a decoder, and most now handle ProLogic, Dolby Digital and DTS. All they need is a suitable sound source, and for ProLogic, it's simply a stereo TV, VCR, LaserDisc player or indeed, the analog stereo outputs from a DVD player. As explained above, 5.1 audio, be it Dolby, DTS or anything else, is delivered to a decoder through a single digital bitstream. This bitstream is transported through a single 'S/PDIF' connector, using either an optical interface or an electrical phono plug.

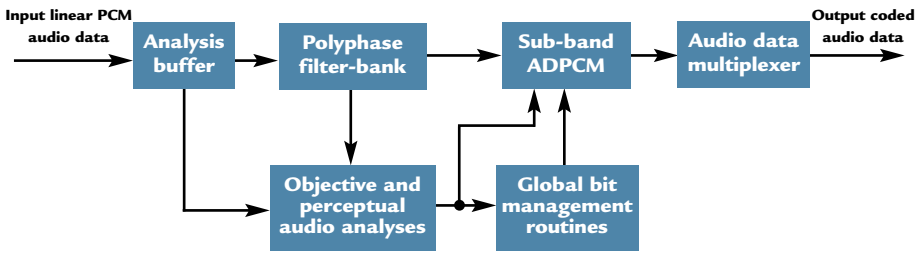
Most domestic DVD and LaserDisc players feature S/PDIF outputs as do PC DVD decoder cards. Many software DVD players can redirect the 5.1 bitstream to an alternative S/PDIF connector, such as one on a sound card. All you need now is a range of DVD titles with Dolby or DTS 5.1 soundtracks – note that many older films use Dolby Digital to deliver just two channels (2.0), which at best will only drive a ProLogic decoder. Also watch out for labelling. EX is already encoded onto several titles, such as the films mentioned above, but is rarely labelled as such on the packaging.

Multi-channel digital surround sound is an unbelievable experience, and it's fantastic that we now have access to the same bitstream at home as they do in the cinema – when you look at it that way, it'd seem almost rude not to use it.

Dolby: www.dolby.com
DTS: www.dtstech.com

GORDON LAING

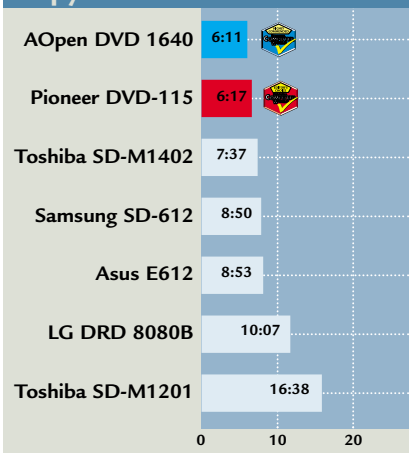
Functional block diagram of the DTS Coherent Acoustics encoder



DTS uses less compression to encode a 5.1 soundtrack and hence, to most ears, sounds superior to Dolby Digital – it does, of course, occupy more space on the disc though

Copy Encarta

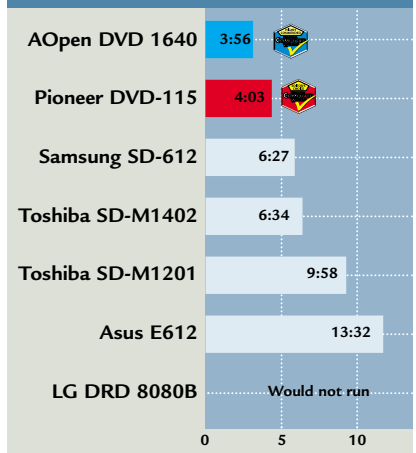
DVD-ROM



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Install Baldur's Gate

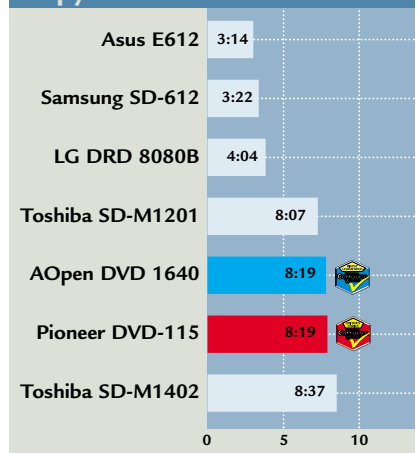
DVD-ROM



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy MPEG files

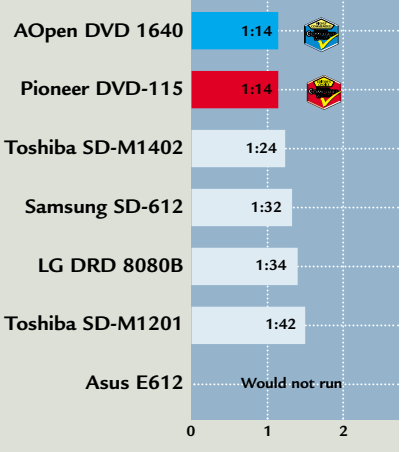
DVD-ROM



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy mixed files

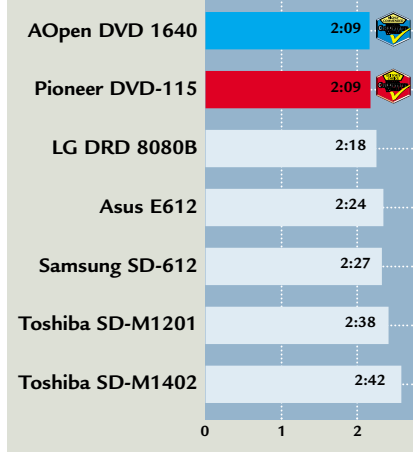
DVD-ROM



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy *PCW* cover disc

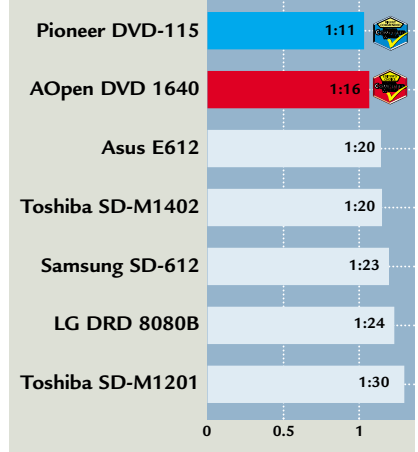
DVD-ROM



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

PSP browse

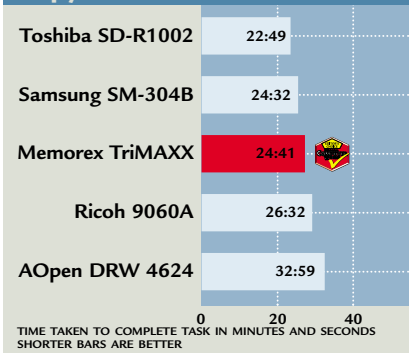
DVD-ROM



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy Encarta

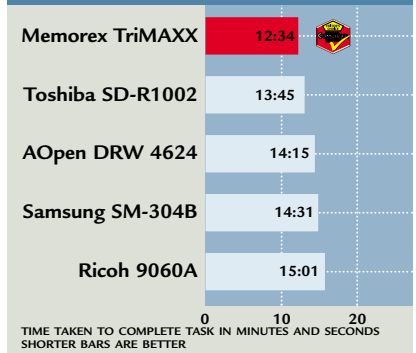
DVD-ROM/CD-RW



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Install Baldur's Gate

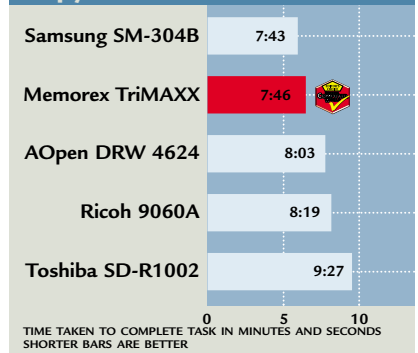
DVD-ROM/CD-RW



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy MPEG files

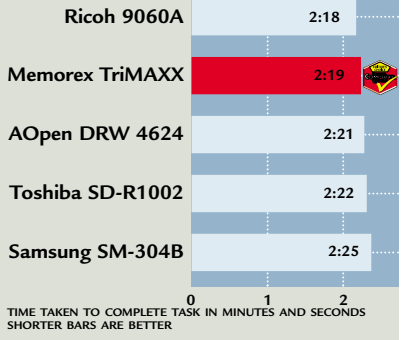
DVD-ROM/CD-RW



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy mixed files

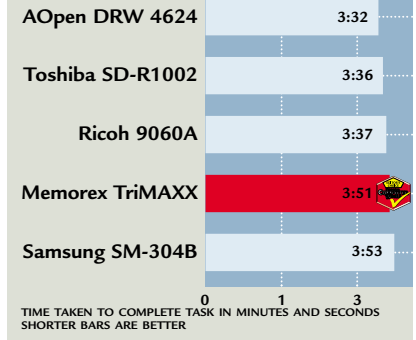
DVD-ROM/CD-RW



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Copy *PCW*cover disc

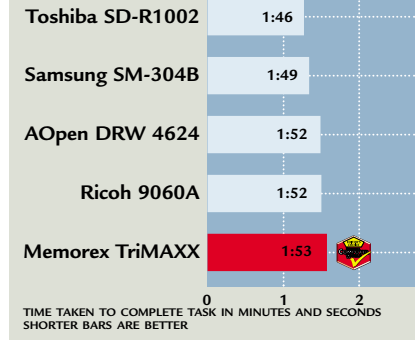
DVD-ROM/CD-RW



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

PSP browse

DVD-ROM/CD-RW



TIME TAKEN TO COMPLETE TASK IN MINUTES AND SECONDS
SHORTER BARS ARE BETTER

Table of features

	DVD-ROM DRIVES				
MANUFACTURER	AOPEN	ASUS	LG	PIONEER	SAMSUNG
MODEL NAME	DVD 1640 PRO	E612	DRD 8080B	DVD-115	SD-612
Price (ex VAT)	£109	£99	£99	£99	£99
Price (inc VAT)	£128.07	£116.32	£116.32	£116.32	£116.32
Manufacturer URL	www.aopen.nl	www.asus.com.tw	www.lge.com	www.pioneer.co.uk	www.samsung-storage.com
Supplier	jungle.com	Landmarq	Dabs.com	Dabs.com	Not available
Supplier phone number	0800 0355 355	020 8768 9301	0800 129 3120	0800 129 3120	Not available
Supplier URL	www.jungle.com	www.landmarq.co.uk	www.dabs.com	www.dabs.com	Not available
HARDWARE SPECS					
Type	DVD-ROM	DVD-ROM	DVD-ROM	DVD-ROM	DVD-ROM
DVD read speed	16	12	8	16	12
CD read speed	40	40	40	40	40
CD-R write speed	N/A	N/A	N/A	N/A	N/A
CD-RW write speed	N/A	N/A	N/A	N/A	N/A
Buffer size	512KB	256KB	512KB	512KB	512KB
Interface	EIDE	EIDE	EIDE	EIDE	EIDE
Loading mechanism	Slot	Tray	Tray	Tray	Tray
Front panel controls	Volume	Volume, Play/Skip	Volume	Volume	Volume
Front panel sockets	Headphone	Headphone	Headphone	Headphone	Headphone
Analog audio out	✔	✔	✔	✔	✔
Digital audio out	✔	✔	✔	✘	✔
SOFTWARE					
DVD/CD-RW software	PowerDVD	None	PowerDVD	✘	None
Region code protection	✔	✘ (Early firmware)	✔	✔	✔

How we did the tests

There are many component-based benchmarks for testing DVD drives. A quick search on the Internet will bring back pages of results with performance tests for such devices. However, here at *PCW*, we believe that readers are interested in how devices will perform doing the tasks that users need them to do. It's all very well running a DVD-ROM benchmark and giving a score at the end of it, but it's hard to equate that score to what you need from the device. Therefore we devised a set of tests that simulated the everyday use of a DVD-ROM drive, to give you an accurate picture of what to expect from each unit on test.

People don't buy DVD-ROM drives to benchmark them, they buy them to transfer data and install applications, and it's how fast each drive manages these tasks that separates the wheat from the chaff.

To give all the drives a true run for their money we devised a series of tests using various types of media, and the same test machine for each drive. The test bed consisted of a 700MHz AMD Athlon processor, 128MB of PC100 SDRAM, a TNT2 M64 graphics card, an Adaptec 29160N SCSI card and an 18GB Quantum Atlas V hard disk. We opted for a SCSI I/O solution to ensure there were no bandwidth problems when performing the tests. Also, the speed of the SCSI drive ensured that the defining factor was always the DVD-ROM read time rather than hard disk write time.

Raw data transfer rate

The first test was to determine the raw data transfer rate of each drive from DVD media. We used Microsoft's Encarta Reference Suite 2000 on DVD-ROM. This disc holds approx 4GB of data which we dragged and dropped onto the hard disk. The timing of the test is taken from the moment the files were dropped onto the hard disk to the point at which the copy completes. This type of file copy will be part of the staple diet of a DVD-ROM drive and the result represents the amount of time you'll be left twiddling your thumbs while waiting for your files to transfer.

DVD-R0M/CD-RW COMBO DRIVES

	TOSHIBA	TOSHIBA	AOPEN	MEMOREX	RICOH	SAMSUNG	TOSHIBA
	SD-M1201	SD-M1402	DRW4624	TRIMAXX 200	MP9060A	SM-304B	SD-R1002
	£88	£110	£219	£169.36	£165	£169.36	£239
	£103.04	£129.25	£257.32	£199	£193.87	£199	£280.83
	www.toshiba.co.uk	www.toshiba.co.uk	www.aopen.nl	www.memorex.co.uk	www.ricoh-europe.com	www.samsung-storage.com	www.toshiba.co.uk
	SMCdirect	SMCdirect	jungle.com	PC World	Dabs.com	Evesham	SMCdirect
	01753 550 333	01753 550 333	0800 0355 355	08705 464 464	0800 129 3120	0800 038 0800	01753 550 333
	www.smcdirect.com	www.smcdirect.com	www.jungle.com	www.pcw-software.co.uk/shop/	www.dabs.com	www.evesham.com	www.smcdirect.com
	DVD-ROM	DVD-ROM	CD-RW+DVD	CD-RW+DVD	CD-RW+DVD	CD-RW+DVD	CD-RW+DVD
	5	12	4	4	4	4	4
	32	40	24	24	24	24	24
	N/A	N/A	6	6	6	4	4
	N/A	N/A	4	4	4	4	4
	256KB	128KB	2MB	2MB	2MB	2MB	2MB
	SCSI	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE
	Tray	Tray	Tray	Tray	Tray	Tray	Tray
	Volume	N/A	Volume	Volume	Volume	Volume	Volume
	Headphone	N/A	Headphne	Headphone	Headphone	Headphone	Headphone
	✔	✔	✔	✔	✔	✔	✔
	✘	✔	✔	✔	✔	✔	✔
	✘	WinDVD	WinDVD, Ahead Nero	Adaptec Easy CD Creator, DirectCD	Ahead Nero, InCD 1.3	Adaptec Easy CD Creator	WinDVD + Instant CD Wizard Gold 5
	✔	✔	✔	✔	✔	✘	✔

Application install
The next test represented the other major part of a DVD-ROM's duty, the application install. We used the DVD-ROM version of the game Baldur's Gate. We chose this particular application because it allowed the largest install we could find at 2.3GB. Software installation is always a pain, and waiting for ages for your new application to install is not something that anyone enjoys. This test was timed from the second that the install button was pressed to the moment that the DirectX install dialog box appeared.

CD tests
The remainder of the tests used CD media, since for the most part CD-ROM discs are still more common than DVD-ROM discs. Here, we used similar tests to the ones we used in the CD-RW group test in the June 2000 issue.

The first test involved copying a 495MB MPEG file from a VideoCD. This tests the sustained transfer rate when copying one large file. This should result in the drive's best transfer rate since the heads do not have to realign every time it has to read a new file, since there is only one large file being read. This test is performed from an original VideoCD movie disc.

The next test uses CD-R media. It's vitally important that all drives can read CD-R media as this type of disc is becoming more popular with the recent price drops in CD-RW drives. We burned a 214MB folder to a CD-R disc, containing a mix of Word documents, Excel spreadsheets, Adobe Acrobat PDF files and HTML pages, then dragged the folder from the DVD drive to the hard disk.

This tested how good each of the drives was at copying multiple files. This meant that a sustained transfer rate could not be achieved since the head was continually moving onto the next file before reading commenced once more.

To test transfer of large and small files from pressed CD-ROM media we used *PCW*'s April 2000 cover disc, which contained 490MB of data. This showed a mix of sustained transfer and access time as the drives negotiated files of varying size.

Finally we used Paint Shop Pro's browse facility to access a total of 44 TIFF images totalling 203MB. This gave an idea of the seek time of the drive as it accessed each of the images and displayed them on the screen. Each drive was timed from the moment that the files were selected until the last image had been displayed on screen.

Editor's **Choice**

It's taken a while, but DVD has finally started to take off. Unfortunately, for the IT industry, the major area where DVD has become successful is the movies. Even though almost every PC ships with a DVD-ROM drive of some kind these days, the amount of software that actually ships on the medium is very low. As a result, many people use their DVD-ROM drives to watch DVD movies on their PC monitor, which in itself is no bad thing.

That said, we can only hope that the vastly increased saturation of DVD-ROM drives in the PC marketplace will improve the software situation and we'll start to see more major applications shipping on DVD rather than multiple CDs.

One of the major issues that DVD suffers from, and has always suffered from, is compatibility. Even though DVD-RAM drives have been available for a couple of years now, there is still no way to read your RAM discs in your ROM drive. Although this is an issue that should be dealt with in the not too distant future. Also, the DVD-RAM discs are still limited to 2.6GB per side, compared with up to 9GB per side on a dual-layered DVD-ROM disc. That said, Panasonic is on the verge of releasing its 4.7GB per side drive. And while the competing format, DVD-RW, claims to be readable in any DVD-ROM drive, we have yet to see a unit, and have therefore never been able to substantiate this claim.

As things stand, DVD-ROM drives have dropped in price sufficiently so that it no longer makes sense to include a CD-ROM drive in a system, no matter how low the price point. So, hopefully, this increased market penetration will make DVD-ROM the standard and the CD-ROM will die out as the standard distribution medium.

Of course, one area where DVDs are becoming more prevalent is on the cover of magazines such as *PCW*. This month is the first time that we have given the reader the choice of either a CD-ROM or DVD-ROM version of our cover disc. The DVD format gives us much more space to include regular content as well as full software products. This also represents another step towards the industry adoption of DVD-ROM as the preferred distribution media for PC applications and content.

Judging the drives in this issue's group test was a matter of real-world testing weighed against value and features. We saw drives with DVD-ROM performance ranging from four-speed up to 16-speed. The pack was also split between standard DVD-ROM drives and DVD/CD-RW combo units. To be fair, and to address the market accurately, we separated these two categories and awarded an Editor's Choice award in both.

The winners

In the DVD-ROM category, the **Editor's Choice** goes to the Pioneer DVD-115. This is a very fast drive, sporting 16-speed DVD-ROM and 40-speed CD-ROM performance. The DVD-115 performed superbly across all the tests, with its 512KB data buffer helping it achieve smooth data transfer. What really impressed us about this drive, however, was the price of only £99 ex VAT. That's not a lot to pay for what is the cutting edge of technology.

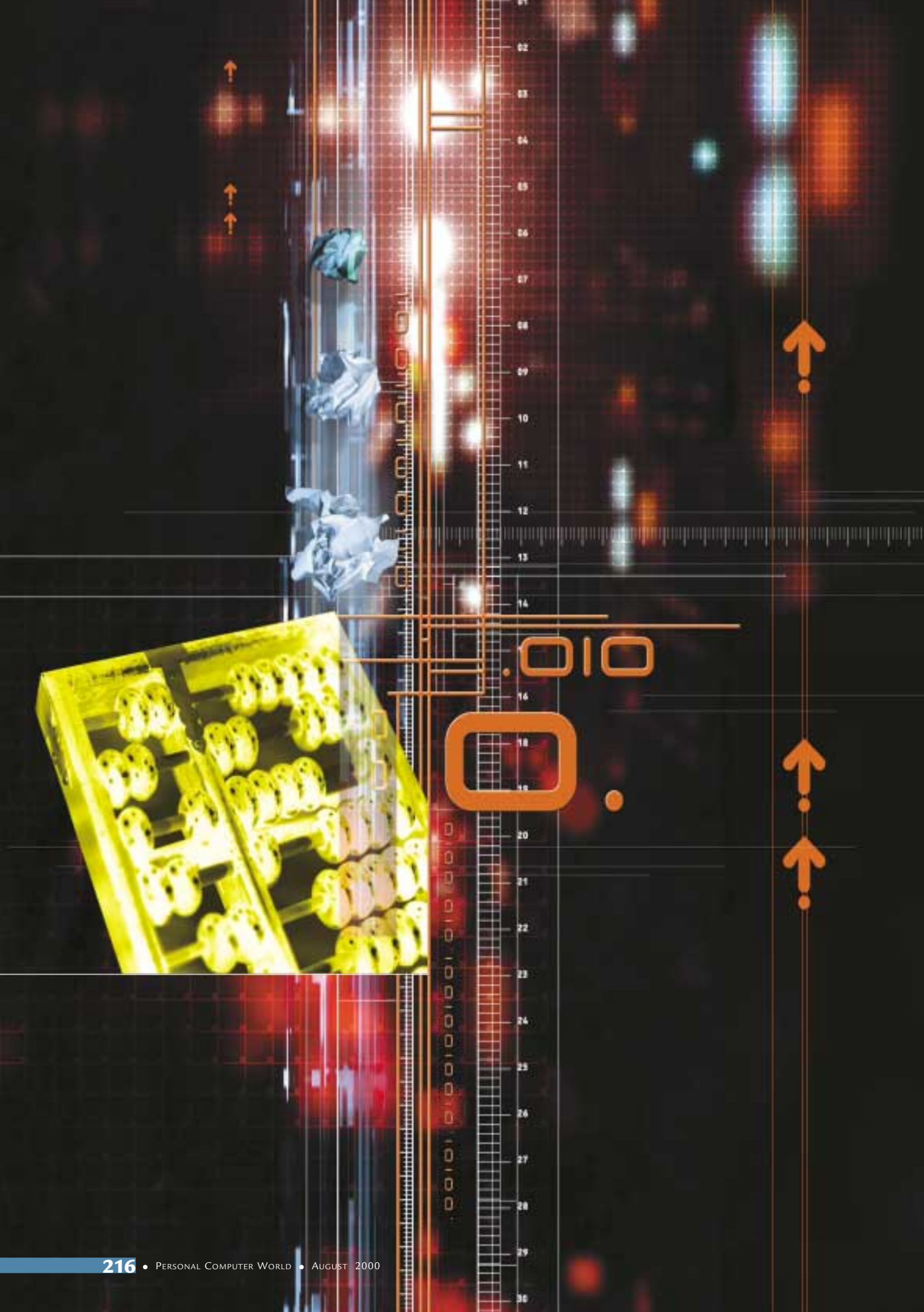
Taking the **Highly Commended** award in the DVD-ROM category is the AOpen DVD 1640 Pro. This is more or less the same drive as the Pioneer, with the same high performance specs. That said, the AOpen proved to be marginally faster than the Pioneer, and it sports a slot loading design, rather than the conventional tray setup. The only thing that held the AOpen back from the Editor's Choice spot was the fact that it was £10 more expensive. However, you do get a copy of Cyberlink's PowerDVD player with it, so if you haven't got a movie player it might be a more attractive buy than the Pioneer.

The DVD/CD-RW combo section was a close fought battle, but in the end the **Editor's Choice** goes to the Memorex TriMAXX 200. Even though this is exactly the same drive as the Ricoh MP9060A, it proved to be faster in the tests. This unit sports four-speed DVD and 24-speed CD read performance, along with six-speed CD-R and four-speed CD-RW writing. Obviously you're making a compromise with a combo drive, but if you don't have the space inside your PC or the cash to buy two separate units, a solution like this makes a lot of sense, and the Memorex is a great choice. Not only does this drive boast impressive specification and performance, it's also great value, with a price of only £169.36 ex VAT to match.

Pioneer's DVD-115 is top DVD-ROM for its speed, performance and price

The Memorex TriMAXX 200 takes the top accolade in the DVD/CD-RW category

AOpen's DVD 1640 Pro includes a copy of Cyberlink's PowerDVD player



A simple equation

Do you really want to spend your working week fighting spreadsheets or old-fashioned ledgers? If the answer is 'no' – and we hope it is – we've drawn together six small-business accountancy software packages to help you figure out your finances.

Accounting software can be godsend for a small business, yet many people shy away from it. This is partly because paper cashbooks often seem simpler. Also, not all of the packages on the high street are as easy to use as they could be. However, the right software speeds up bookkeeping, eliminates arithmetical mistakes and often removes the need to understand double-entry accounting.

Some businesses use spreadsheets for accounting. This has advantages over pen and paper, but it's easy to enter a formula incorrectly, and spreadsheets can require a considerable amount of setting up. There is also hassle in extracting information to create reports.

The cost of a dedicated accounting package is small when you consider that most packages integrate the functions of a spreadsheet with databases of suppliers, customers and stock, and a desktop publisher for producing invoices, purchase orders and the like.

This integration can save a lot of time: when you enter an invoice into an on-screen form, a delivery note can be automatically produced and the transaction entered into the ledger. Quick access to information is a good reason for getting a dedicated accounting package. In most packages, within seconds you can find out how much you spent at B&Q in the past year, or how much you've spent on office equipment and you can sort reports by any field instantly. Whether you buy an accounting package is really a question of whether you are in business to spend all day fighting with a spreadsheet, or to get the paperwork done as quickly as possible. A pretty simple equation to solve.

To help with your choice we've tested six dedicated small business packages, along with a couple of suitable personal accounting packages (Microsoft Money and Intuit Quicken). Read on to find out which is the right package for you.

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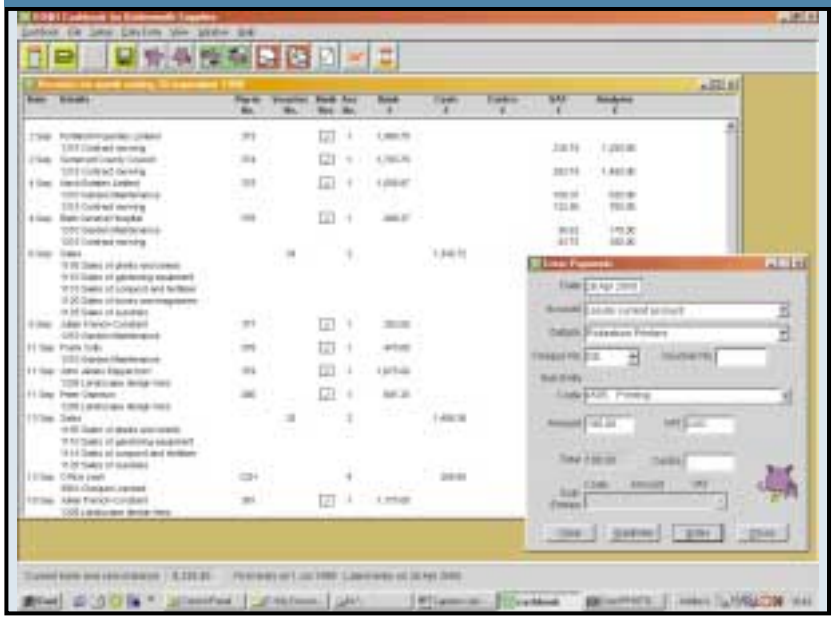
• Software tested and reviewed by Alex Singleton

DO$H CashBook



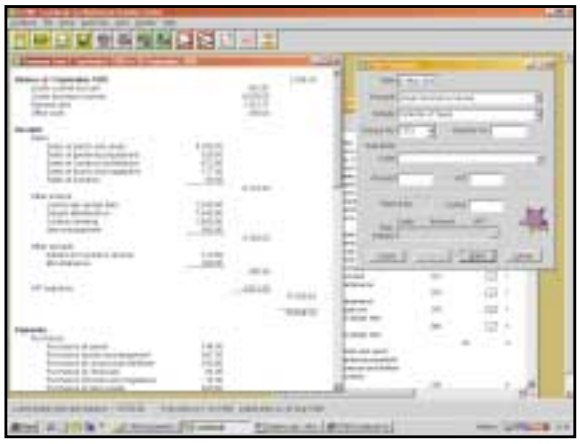
Out of the packages we tested, DO$H CashBook is the easiest to operate

DO$H CASHBOOK is the easiest of the accountancy packages to get into and is aimed squarely at the lower end of the market. Designed by a chartered accountant, its intended market is the one or two-man band that simply needs an electronic cashbook, has no demands for tracking debtors and creditors, and has no need to print invoices. CashBook has sold over 100,000 copies, doubtless boosted by a partnership with Lloyds TSB, which gives the software to startup businesses.

DO$H is designed for businesses that are either not VAT registered or that use the VAT cash-accounting scheme. This is the scheme that businesses with small turnovers can sign up to so that they only pay VAT to Customs and Excise once they have received payment from their customers. This has the advantage that the firm doesn't end up owing the tax office when customers don't pay on time. DO$H, therefore, is unsuitable for businesses on the more usual accrual scheme, where VAT is due when invoices are issued. Companies dealing with stock or supplying on invoice should similarly look elsewhere.

The program has two windows for entering transactions. One is for entering receipts (payments into the business) and the other for entering payments (to suppliers). Both are very easy to understand and the average user should be entering real transactions within minutes. The dialog boxes are not as keyboard-friendly as they could be – if you type in 'Pers' as the supplier, it won't automatically expand this to 'Personal Computer World', for instance. Instead, you have to select the supplier from a pop-up menu. Admittedly, the keyboard can be used to operate the menu, but this isn't as straightforward as it could be. However, CashBook's users are likely to have fewer transactions to deal with than users of the other software on test here, so this may not be such a big issue.

CashBook lets you categorise each transaction with a code, but there is no facility to attach a note to an entry – for example, explaining that the payment was because the customer had been overcharged. New codes may be added, although not deleted – presumably to prevent keen new users from deleting all the default codes and then realising that they are there for a reason.



The Summary window lets you see income and outgoings

Two spreadsheet-style displays are provided for showing past transactions, again one for receipts and the other for payments. These displays will only show a single month's transactions at a time and cannot be sorted except by date. Also, unlike the two personal packages examined later, entries cannot be directly entered or altered here. We found it frustrating that everything has to be done through a dialog box. The exception is bank reconciliation, which is done by ticking a box. Also, splitting transactions between several categories is not as easy as in some of the other packages reviewed here.

Reporting is somewhat limited, but, nevertheless, CashBook does provide for most needs. Printouts of the spreadsheet-style displays can be made, along with some summary reports (which can include any number of months). Again, these have to be sorted in the way CashBook wants to sort them. Additionally, CashBook won't print a list of transactions related to a particular customer or supplier, or create any of the graphs offered by QuickBooks. However, a VAT report, showing what you need to write on a VAT return, is available at the click of a button.

The beauty of CashBook is that it has virtually no learning curve. All of the other packages in this group test will require a novice to spend several hours ploughing through the manual and finding out the right way to enter transactions. Not so with CashBook. The 80-page manual is outstanding – taking you through the program in clear and simple English – and a multimedia tutorial is provided on a CD-ROM.

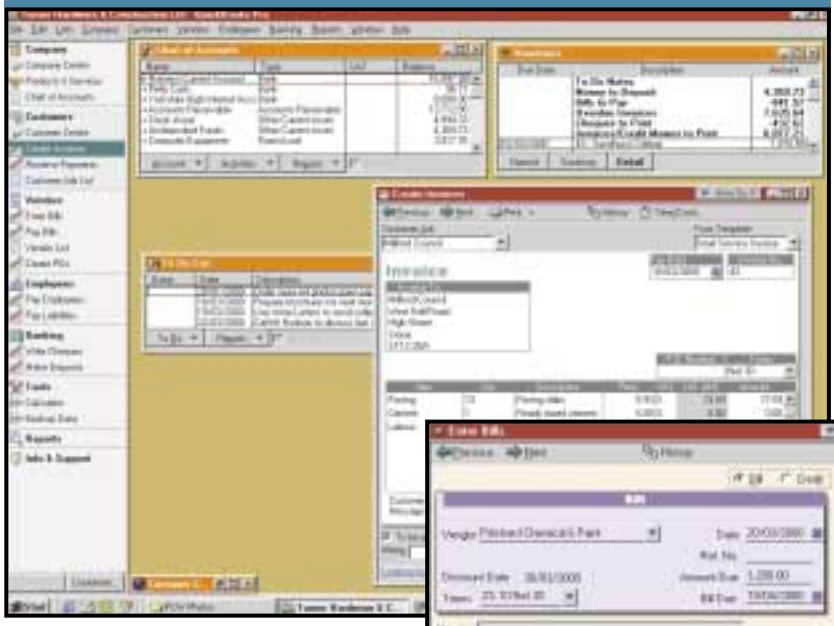
There isn't much of an upgrade path from CashBook – you can't swap up to a networkable version if your business expands. That said, the sort of business CashBook is aimed at is the proprietor who keeps all the invoices in a box file until the end of the VAT quarter and is unlikely to be in a rush to upgrade. An optional payroll module is now available and DO$H has announced an invoicing program, DO$H Invoice, although clearly using this along with CashBook isn't going to be as convenient as having an integrated program.

DETAILS

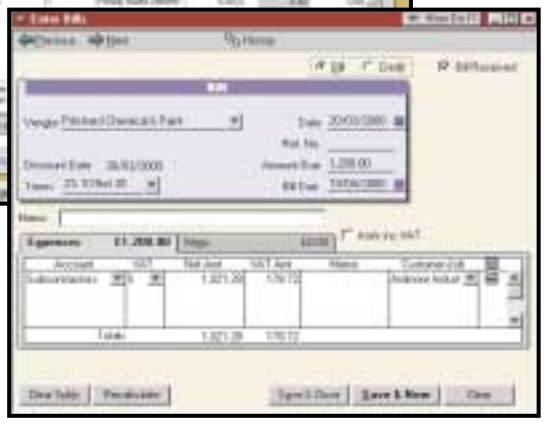
★★★★

PRICE £59.99 (£51.06 ex VAT)
CONTACT Do$h Software 0800 026 4666
www.dosh.co.uk
PROS The easiest package to learn with an outstanding manual
CONS Limited feature set could be a hindrance
OVERALL If the package has the features you need, go for it

Intuit QuickBooks 8



On-screen invoices imitate their paper equivalents giving a sense of familiarity



Entering a supplier's bill is easy as, if you enter the first few letters of a name, Quickbooks will guess the rest

EARLIER VERSIONS OF QuickBooks have won much praise from *PCW*, and it is one of the most frequently updated packages in the group test. Version 8 sees a re-worked user interface, with many of the information windows being web pages (the software uses Internet Explorer 5). Gone is QuickBooks' big Navigator window (a graphical menu that gave access to the program's key features). This has been replaced by a new Navigation Bar, which smartly rests at either side of the screen. The items on the bar can be customised and, since it can always be in full display – unlike its predecessor – it makes navigating your way around the program that much quicker.

Setting up QuickBooks 8 for the first time is done by answering a series of questions. The software takes greater care to explain the consequences of different options than any of its competitors and, after asking what industry the business is in, it creates a set of default categories relevant to that industry. In use, we were impressed by the level of help offered, in particular through the context-sensitive 'How Do I?' menus attached to every window. QuickBooks' ease of use is still outstripped by MYOB Accounting, but not by much. All lists can now be sorted by any of the columns, which should make it easier to find the most overdue customers.

Invoices, statements and purchase orders can, for the first time, be sent by email. QuickBooks integrates with most email clients, such as Outlook, Outlook Express, Eudora and Netscape Messenger. It sends the invoice as a cover note, which can be altered for each invoice, with an attached PDF file. Although emailed invoices are not to everyone's liking, this feature was impressive and, at the very least, beats faxing replacements.

Entering day-to-day transactions is extremely quick and easy with QuickBooks. Many of the other packages make you select items from pop-up menus or windows, or remember codes. With QuickBooks, if you know what you are looking for, you can simply type the first few letters and QuickBooks will find it. When selecting a particular company, it will even remember the category and price of the last transaction. Also, a feature called QuickAdd lets you enter new suppliers or customers without having to enter details about them into the supplier or customer databases.

If you wish to send your accounts to your accountant by disc or email, QuickBooks can create an Accountant's Review file. This lets you continue using QuickBooks at the same time as your accountant makes alterations. When you receive the file back, you can import the adjustments into your main file.

Payroll facilities have also been introduced in QuickBooks 8. All the appropriate deductions from an employee's pay are automatically calculated and the software prints payslips along with end-of-year reports such as P60s. A subscription to QuickBooks' payroll service ensures that the software's tax tables are always correct and when you access the Internet (even without QuickBooks loaded), any updates to the tax tables are downloaded in the background.

Although QuickBooks is not a fully multi-currency package, it does let you print invoices with the VAT and total amounts in a foreign currency as well as in sterling. Every monetary field now links to a currency calculator, which lets you enter the amount in a foreign currency and then convert it to sterling to record in QuickBooks.

A higher-end version of the software, QuickBooks Pro, introduces Microsoft Office integration. Letters chasing up overdue invoices, or general sales letters, for example, can be designed in Word and later mail-merged from within QuickBooks. However, unlike TAS Books Accounting, QuickBooks cannot use Word to produce invoices. That said, designing invoices inside the package is unsurpassed by its peers. The layout designer is the least fiddly, although it lacked the undo facility provided by MYOB.

We were impressed that when viewing a report in QuickBooks Pro, a couple of clicks can send the reports automatically into Excel, keeping all of the formulae and most of the formatting intact. Also, the problems of keeping records in an accounting package and a contact manager have been eliminated – contacts can be synchronised between QuickBooks Pro and either Outlook or Act!

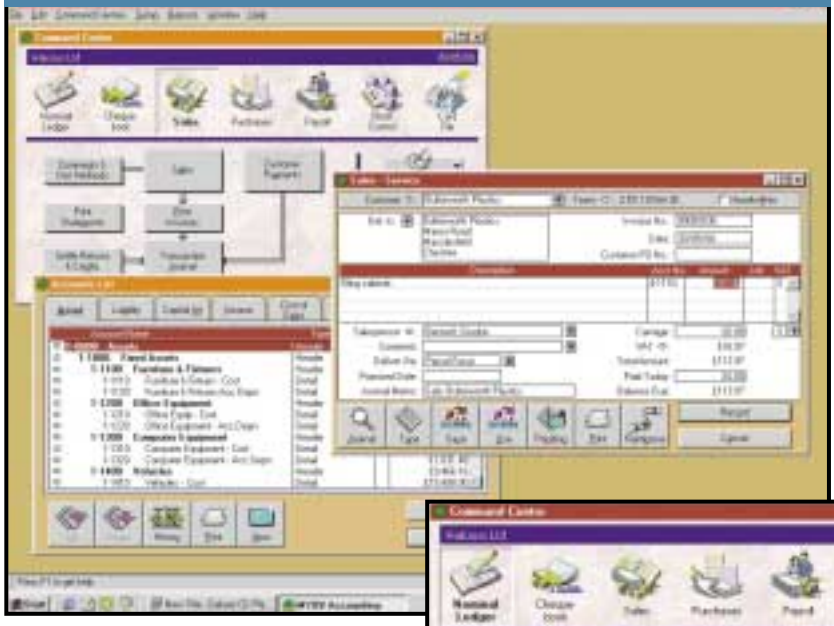
QuickBooks Pro can produce estimates, quotations and pro-forma invoices and supports job and time costing. A software stopwatch is provided to track how long a job takes, and the results can be applied to invoices and payroll timesheets. Pro is also network ready, enabling multiple users to operate the software simultaneously.

DETAILS

★★★★★

PRICE
QuickBooks 8 £99 (£84.26 ex VAT)
QuickBooks Pro £199 (£169.36 ex VAT)
CONTACT Intuit 0800 585 058
www.quickbooks.co.uk
PROS Fast data entry combined with a solid user interface
CONS None of significance
OVERALL The best small-business accounting package is now better

MYOB MYOB Accounting

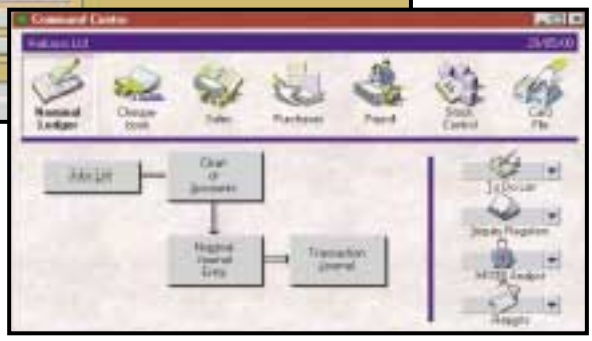


Invoicing a customer is a quick operation

MYOB WAS ORIGINALLY released as a Macintosh product in 1989 and the PC version has been a past winner in *PCW* group tests. It was upgraded to version 8 last autumn (although MYOB doesn't actively publicise the version number). A higher-end version, Accounting Plus, is also available if you need to upgrade later and it offers multi-currency support and enhanced stock control.

Setting up the package is not initially a complex process, as a wizard is provided to guide you through each step. However, MYOB asks a lot of not terribly relevant questions, making it a longer task than in the packages from Sage, TAS or Intuit. It creates the default categories based on the type of industry selected in the wizard. Nevertheless, in general use, MYOB is the easiest package in the group to use (ignoring DO$H CashBook) and this isn't achieved by sacrificing features either.

The thick, single-volume manual is superb, but help within the program isn't as good as in QuickBooks. On loading the package, a Command Centre gives access to the program's main functions.

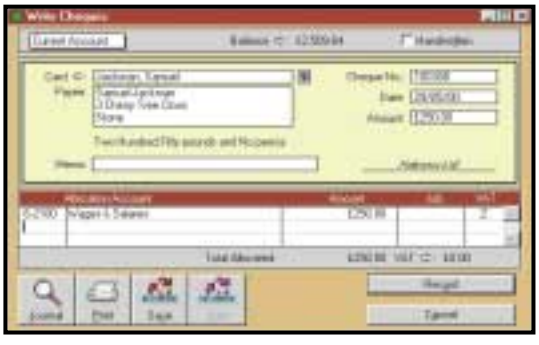


The Command Centre gives access to the main features

This is great because it is split in two – selecting Sales from the top row of icons makes a flowchart of sales-related options appear underneath. The use of a flowchart makes it obvious which tasks need to be done first.

Entering transactions is more straightforward than in any of its competitors, bar QuickBooks, which is similar in design. Paying a supplier involves writing an on-screen cheque. Under the cheque are fields for categorising the transaction; if you need to split the category, this is clearer than QuickBooks' method.

MYOB lets you create new suppliers while filling out the cheque, making it more productive than Instant Accounting. However, it required users to either remember a numeric code for each category or select the category from a pop-up dialog box. Unless you have a brilliant memory, this makes it slower to operate than QuickBooks. Having said that, MYOB remembers the last categories to be applied to a supplier. Also, if you are entering a firm you have previously bought from, you can type in the first few letters of the name, and it will find it for you. If you enter bills as unpaid, when they are due for payment, a list is displayed when the program loads.



To pay a supplier you just write an on-screen cheque

Invoicing customers is a clear-cut process and there are fields for the salesperson's name, the delivery method and a special message. Invoices can be batched ready for printing. A good invoice designer is provided, but is slower to use than QuickBooks' , lacking time-saving features such as centring of text boxes. Reporting is excellent, with MYOB able to export reports as a web page. Software called OfficeLink allows you to pipe reports to Microsoft Excel. Similarly, the package is able to use Microsoft Word and WordPerfect to produce personalised letters. However, there is no integration with the contacts manager side of Outlook, nor can you email documents from MYOB.

Looking up past transactions is done in almost the same way as in QuickBooks. Everything entered into MYOB is listed in the transaction journal and clicking on an arrow beside each entry shows the original invoice, credit note, etc. These can be altered directly. However, we preferred the QuickBooks method, because it keeps the listing of transactions for customers, for example, in the Customers window, rather than hidden away as in MYOB.

When chasing up overdue invoices by phone, or dealing with suppliers that have mischarged you, it is a good idea to keep records. MYOB has the best features for doing this, as, in its customer and supplier databases, you can attach notes of conversations. It will also dial phone numbers for you, assuming you have a modem.

It will not be easy to outgrow MYOB. Job costing is implemented, along with pro-forma invoices (which it calls 'pending' invoices) and good stock control. New to version 8 is an integrated payroll module which makes it a good choice for expanding businesses. The package is network-ready, too; multiple users can operate the software at the same time, as long as enough licences are bought.

DETAILS

★★★★

PRICE £229.13 (£195 ex VAT)
CONTACT MYOB 01752 201 901
www.myob.co.uk
PROS Incredibly easy to operate
CONS Not quite as efficient as QuickBooks
OVERALL A excellent package that will not baffle you with jargon

Pegasus Capital Lite

Capital Lite's invoicing facilities aren't the clearest to navigate

PEGASUS IS THE UK's number two supplier of accounting software, mainly attracting customers from medium to large businesses. Capital Lite is Pegasus' small-business product and is available on the high street. Capital Lite was the only package to come on floppies rather than a CD-ROM – two for the program and one for a graphical tutorial. A consequence of using floppies is that the on-screen help is virtually non-existent. There are some cue cards available, but they cannot be viewed at the same time as entering data, except when setting up a new company. Bubble help can be activated, but offers only a couple of words for each field.

Installing and setting up the package was not easy. The manual is badly organised and skims over some of the more complicated operations. For some reason it splits setting up a new file into two parts, separated by 20 pages on how to use Windows. Installation was not helped by an assumption that the user would be using Windows 3. Setting up a new file is helped by cue cards, but having to click 'Next' on the cards to move to the next field slows the process down. Once the file has been created, the program goes into 'opening balances mode'. The problem is that the program makes no attempt to show you what to do or that this mode is for entering the outstanding invoices of your customers and suppliers. Nor is it clear how to exit this mode, but once the opening balances mode has been quit, you cannot return to it.

After all the setting up, the user is provided with a blank screen. There isn't a Sage-style button bar with the program's main features, but if you can work out where to find it, a navigator is provided, which works in a folder format such as Windows Explorer. The navigator is not in the same league as those provided by QuickBooks and MYOB. When entering transactions, Pegasus does not use any paper-like forms, which makes its learning curve steeper than the other packages in this group test. Estimates and pro-forma invoices can be produced along with ordinary invoices, which – combined with the program's handling of stock – make it ideal for companies trading with goods.

There is no job costing, so the program is not suitable for businesses that need to assign purchases to particular customers or tasks. Pegasus does not come with an invoice designer, nor can it integrate with Word, so you are pretty much required to buy pre-printed stationery, and the program cannot print cheques. The lack of an invoice designer makes it less suitable for the smallest of businesses that are unlikely to be producing enough invoices to make pre-printed stationery worthwhile.

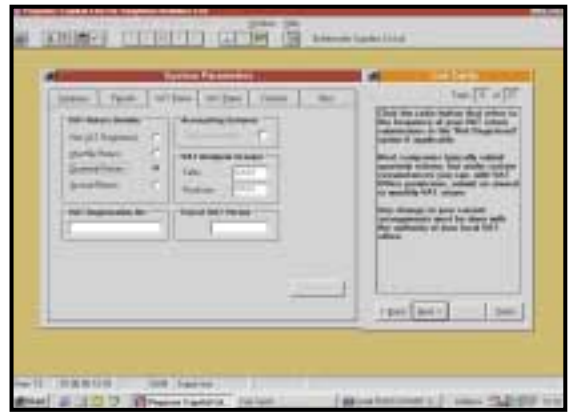
Like many of the packages, Capital Lite works out if a transaction's date refers to a previous VAT period and forward dates it if necessary, but it would be better if transactions were given both an invoice and a posting date. Oddly, it assumes that everyone deals in VAT-exclusive prices, so if you buy regularly from retail outlets, which often only publish a VAT-inclusive price, you will find the package somewhat irksome.

For small-business packages, it is important that users can correct mistakes easily. Pegasus is of the traditional school in accountancy software, which means that mistakes cannot be corrected easily. If you type in the wrong figure for a purchase, you cannot simply call up that purchase and make a change. Instead, you have to enter an additional invoice or credit note to increase or decrease the amount. This really shouldn't be necessary.

The ability to look up past transactions was not as good as in other packages and while you can drill down to see a summary of the transaction, you cannot see the details of an invoice as originally entered. The reporting facilities are good, with over 50 available reports that can be exported in a number of formats, including Excel and Word.

Capital Lite fails to offer the ease of use provided by the other packages in this test which, combined with a below par manual and the use of accounting terms without explanations, makes it a bad option for non-accountants.

The package was not entirely reliable either, regularly complaining about lack of memory for no apparent reason. If you specifically need a product that is compatible with the higher-end versions of Pegasus, Capital Lite will do the job, but otherwise you would be better off choosing something else.



Capital Lite works out the VAT period of transactions' dates

DETAILS

★★

PRICE £99 (£84.26 ex VAT)
CONTACT Pegasus Software 01536 495 000
www.pegasus.co.uk
PROS Good for those used to Pegasus' higher-end packages
CONS A poor user interface makes Capital Lite difficult to use
OVERALL There are better packages on the market

Sage Instant Accounting

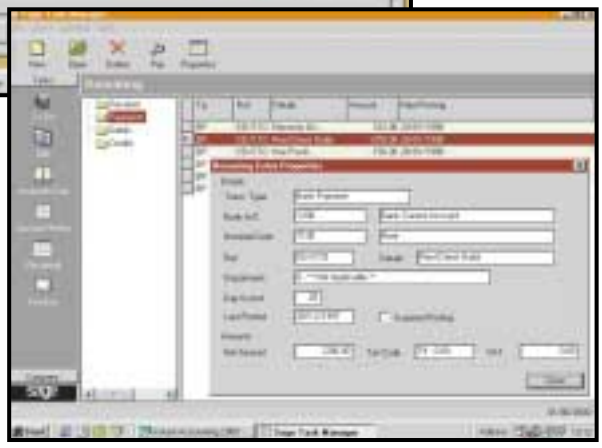
Entering a credit note in Instant Accounting

INSTANT ACCOUNTING is an impressive package, although not the most powerful in this test. Published by Sage, the world's largest supplier of accounting packages, it has an excellent upgrade path for growing businesses. The package is one of the less powerful in the group, but users can upgrade later to Sage Line 50, safe in the knowledge that it has a similar interface.

Setting up a business in Instant Accounting was trouble-free due to an easy startup wizard. This is much better than Pegasus' or even MYOB's equivalent, but the explanations given by QuickBooks' are a touch clearer. The manual is well-written too, giving a detailed explanation of how to enter opening balances and containing a glossary of accounting terms. Wizards are also used for adding new customers and suppliers and we were particularly pleased to note that on adding a customer, we were asked if there were any outstanding invoices or credit notes that needed entering. We were then given the option to enter them as a single figure or individually.

Navigation around the package is helped by a clear button bar, containing both icons and text. Useful context-sensitive help was also provided. Sage has worked hard to remove much of the accounting jargon found in its higher-end products, making it more appropriate to the business owner or manager. For example, instead of purchase and sales ledgers there are suppliers and customers. We were suitably impressed.

Nevertheless, Instant Accounting is not as easy to use as MYOB or QuickBooks. Working out how to invoice customers is initially confusing.



Direct debits are easily set up in the Payments section

The invoice option in the customer database is for entering sales where a paper invoice is not required. For paper-based invoices you have to go to a separate invoicing section.

In general, invoicing was straightforward and, in particular, it was obvious how to change between a product invoice (which prints stock number and quantity columns) and a service invoice. The Invoicing window gives a list of past invoices, which you can double-click to get to the original invoice, making it simple to print out duplicate invoices for ones that have gone astray. Many of the on-screen forms impersonate their paper-based equivalents – paying suppliers involves writing an on-screen cheque, for example.

In most of the software reviewed here, there are several ways of doing the same thing, with options duplicated in the places they would most likely be needed. QuickBooks was strongest on this, offering menu buttons on many of the windows, giving access to other relevant parts of the program. But in Sage, you have to remember where it keeps a particular feature – dropdown lists of customers do not contain an option to add a new one, for example. Instead, you have to go into the program's customer window and click 'New'. Add to this the fact that some tasks actually prevent you from accessing other parts of the package and you soon start to feel that the program is not as integrated as it could be.

Sage is the only package that does not let you split transactions between two categories. If, for example, you bought both a computer (which needs to be depreciated over time) and stationery from the same firm, you would have to enter the transaction as two separate invoices, which is hardly ideal. There is no job costing either, making the program unsuitable for businesses that need to work out how much they have spent on a customer's job.

Nearly 100 reports can be created by Instant Accounting. A report designer is provided, allowing the majority of reports (along with invoices, credit notes and statements) to have their layouts altered. The default settings are compatible with Sage's stationery products, but there is no reason you cannot design your own. Bulk letters to customers and suppliers can be sent using the package, but there is no integration with Microsoft Office. Also, Instant Accounting is not suitable for businesses needing to print cheques. The software lacks any estimating facilities, which limits the range of businesses that Instant Accounting will appeal to and, despite tracking stock (as do all programs in the group apart from DO$H CashBook), there is no support for pro-forma invoices.

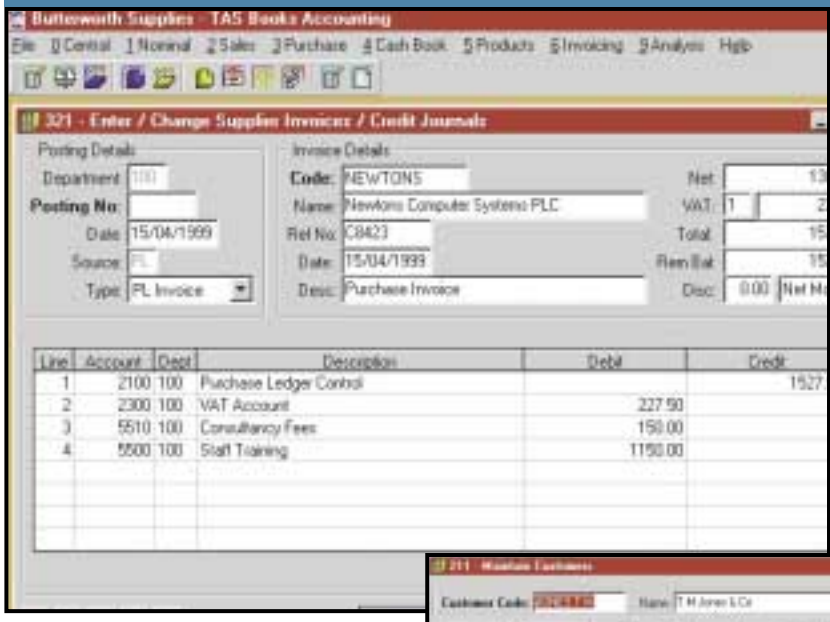
A Microsoft Outlook-styled Task Manager lets you create a to do list, track bills that are due for payment and keep an eye on recurring entries such as standing orders and direct debits. This was superb, but it is a shame that Instant Accounting doesn't integrate with Outlook itself.

DETAILS

★★★

PRICE £99 (£84.26 ex VAT)
CONTACT Sage 0191 255 3000
www.uk.sage.com
PROS Clear interface and good upgrade path
CONS Low on features and not the easiest package to use
OVERALL If you think you may need Sage Line 50 in the future, this is a good place to start

TAS TAS Books Accounting



Entering purchase orders is quick and easy

TAS BOOKS first entered the market in 1991 as a DOS package. Back then it was revolutionary, being the first PC package to allow mistakes to be corrected easily. Now TAS runs under Windows and is the most powerful package in this group test. Several versions are available, all sharing the same user interface, but here we're looking at the entry-level version, TAS Books Accounting.

The software allows you to configure it for a new business quickly and easily, without creating a fuss about less relevant options. Good explanations of the more complicated choices are provided on-screen, such as the difference between accrual and VAT cash accounting. However, after the initial setup, TAS makes less effort than QuickBooks or MYOB to show you where to start entering your data. There is no pictorial command centre, instead you have to dig around in the menus. Having said that, the program's windows are clear and the software has particularly logical menus.

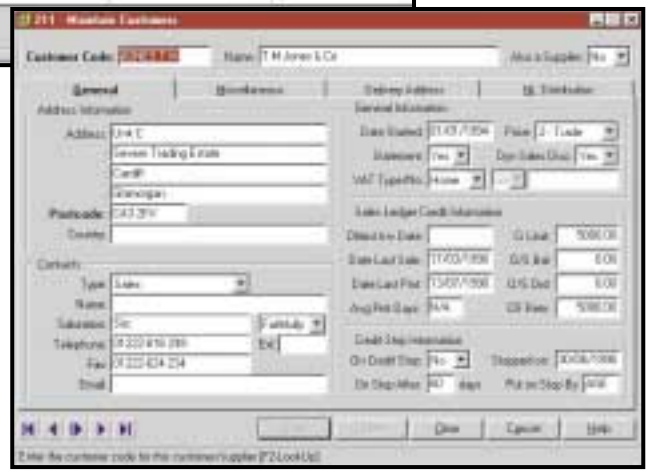
Data entry is fairly quick, with the program noticeably designed for users with large numbers of transactions. As you might expect, all the program's functions can be accessed with the keyboard. Each window has its own three-digit number assigned to it, so regular users can simply press Alt and the relevant number to get there quickly.

TAS requires purchase invoices to be entered and paid separately. Users cannot simply write cheques to suppliers as they can in QuickBooks, for example. TAS is therefore best suited to businesses that enter purchases as they go along, paying mainly on account. Entering purchase invoices is nevertheless efficient. Suppliers can be selected from a menu and the software remembers (from previous entries) how to categorise the transaction. Transactions may be split between different categories. The oddity is that TAS requires the amount to be entered twice, both at the top of a purchase order window and later when categorising the entry, but this does at least help prevent typing mistakes.

TAS Books is easily the best package when it comes to handling VAT. When entering an invoice, you are asked for both an invoice date and a posting date. TAS Books always posts invoices to the correct VAT quarter, even if the invoice has been entered late. The other packages either prevent transactions from being entered in a previous quarter or let you set a date that you can't post before. This is less satisfactory because it makes it more difficult to find invoices later on.

TAS' supplier and customer databases are the most sophisticated in this group test, which makes the software especially suitable for businesses with networked users, where paper records are not readily to hand. As TAS effectively keeps only one database of customers and suppliers, a supplier can be designated also as a customer at the touch of a button. This means contradictory entries can be made easily (this is where a purchase invoice is paid off by subtracting the value of what a supplier owes in the form of a sales invoice). A Customer Activity Report lets you see if customers are buying less than they used to, which might mean you give them a call or offer them a greater discount. Pro-forma invoices can be produced by TAS, making the package a good choice for businesses with stock that invoice and receive payment before delivery.

Getting reports out of TAS is straightforward, and each report can be 'printed' to the screen or disc (in the form of a comma separated values (CSV) or text file) as well as to a printer. Unlike QuickBooks, TAS will not link in with Excel, although the CSV files can of course be transferred. The package integrates with Microsoft Word for designing invoices, purchase orders and so on, which means that TAS users are likely to have the best-looking printouts. Cheques with remittance advice slips can be printed if you have the appropriate stationery.



TAS Books Accounting's customer database is the most powerful in the group test

Two manuals were supplied – a tutorial and a reference book. The tutorial was rather disappointing, not really giving enough information for the new user and tending to say what the program can do rather than how to do it. Nor is the help within the program particularly useful. So although TAS Books is not the easiest program to use, compared to the others reviewed here, it is definitely the most powerful.

DETAILS

★★★★

PRICE £149 (£126.71 ex VAT)
CONTACT TAS Software 01372 727 274
www.tassoftware.co.uk
PROS Exemplary handling of VAT
CONS Not as easy to use as MYOB or QuickBooks
OVERALL Perfect for larger companies in the market for accounting software

Personal accounting packages

Many view personal accounting packages as too much hassle. Certainly in days gone by, entering transaction after transaction was a time-consuming process. However, with the advent of PC banking (where transactions can be downloaded from a bank) this has changed.

Many people's affairs are simple enough that they just want to know how much money they can afford to spend in any given month. For these people, mobile phone and Internet banking is probably sufficient. Nevertheless, the two main packages – Microsoft Money and Intuit Quicken – have tried hard to expand their usefulness, adding features such as home inventory and share tracking facilities.

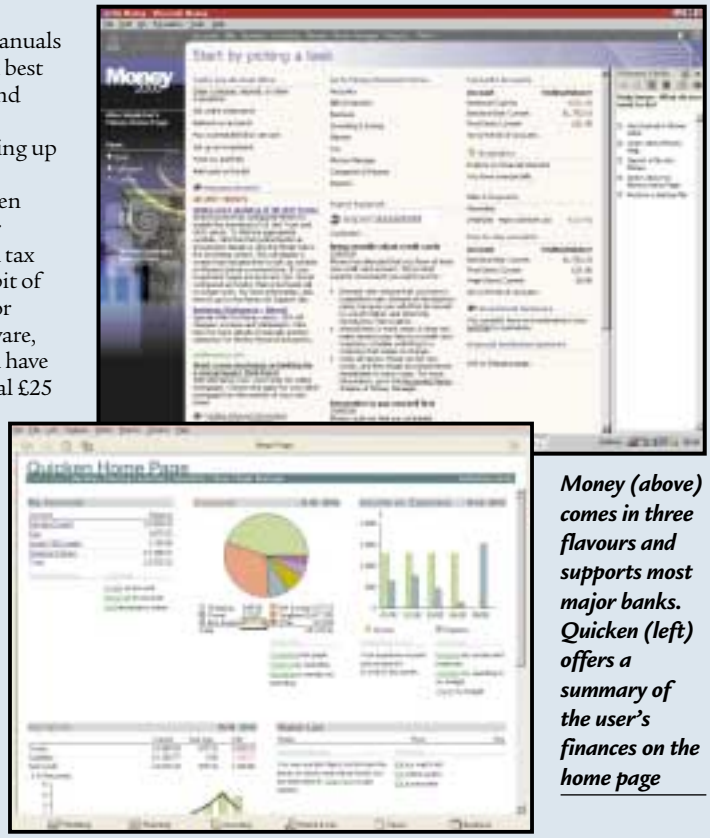
Money 2000 is the first version of the product to be available in three editions: Standard, Financial Suite and Personal and Business. Standard includes the product's core features, meaning that it will look after a person's day-to-day finances, and includes a home inventory and portfolio manager. Financial Suite adds financial articles to read, has a long-term financial planner (for managing mortgages, loans and so on) and a will writer. Personal and Business is Money's first edition to look after Business users in a meaningful way, adding support for tracking VAT and checking up on outstanding invoices. At £69, it is not much cheaper than some of the packages designed specifically for business users.

Quicken comes in two versions – a standard version and Quicken Deluxe. Quicken has some business support, notably the ability to send statements, but its VAT handling is cumbersome. You have to go into a separate window and split each transaction's category. Rudimentary invoicing facilities are provided in both Quicken and Money, but the invoices they produce are unattractive and the design cannot be altered. Disappointingly, the manuals with both products can best be described as 'slim', and neither gives enough information about setting up business accounts.

Included with Quicken Deluxe is a program for producing self-assessed tax returns. This may be a bit of a gimmick, especially for the more financially-aware, but Money users would have to fork out an additional £25 if they wanted Microsoft's equivalent package. Quicken Deluxe offers similar business features to Money Personal and Business, while being £20 cheaper. For this reason, if you really must buy either Quicken or Money for business use, go for Quicken.

There is little to separate either program in terms of design. Both have a web-style interface and present users with a 'home page' when the package is started. This home page gives a summary of the user's finances and the information displayed can be customised. Yet in both packages, a sheet of transactions, known as the 'register', is the main display. Like a spreadsheet or cashbook, this lets you enter payments in or out of your bank account one after another down the page. Quicken's register was a bit better, letting you enter transactions directly without reducing the number of items visible.

PC banking is offered by both packages, allowing transactions to be downloaded through a modem. Quicken, however, only supports PC banking with NatWest, so if you have accounts elsewhere, you may be better with Money, which supports most major banks and has the ability to pay bills electronically. It can be a job remembering to pay bills on time and both packages can warn of overdue bills when Windows starts up. The latest versions let you enter basic transactions without the need to load the full versions of the software.



Money (above) comes in three flavours and supports most major banks. Quicken (left) offers a summary of the user's finances on the home page

Inevitably, the features of both products have mushroomed. The question for many purchasers must be whether the software remains easy to use. It's all very well having a home page and portfolio tracking, but most first-time users don't want to dig around to find the register. Both packages are more complicated than they once were and it can be argued that some of the business packages – DO$H, QuickBooks and MYOB – are simpler to get to grips with. However, both Intuit and Microsoft have done a lot to compensate for increased complexity, including audio and video clips and comprehensive help systems.

Business users would undoubtedly be better off purchasing a dedicated package. Home users with unambitious requirements should consider whether they will actually have the motivation to keep the package up to date, or whether a spreadsheet will suffice. However, if you plan to use the more advanced features, both Quicken and Money will do an excellent job.

DETAILS

INTUIT QUICKEN 2000

★★★★

PRICE £29.99 (£25.52 ex VAT), Deluxe version £49.99 (£42.54 ex VAT)
CONTACT Intuit 0800 585 058
www.intuit.co.uk

MICROSOFT MONEY

★★★★

PRICE Standard £29.99 (£25.52 ex VAT), Financial Suite £49.99 (£42.54 ex VAT), Personal and Business £69.99 (£59.57 ex VAT)
CONTACT Microsoft 0345 002 000
www.microsoft.com

Table of features

Company	Do$h Software	Intuit	MYOB	Pegasus	Sage	TAS Software
Product	CashBook	QuickBooks 8	MYOB Accounting	Capital Lite	Instant Accounting	TAS Books Accounting
Contact tel no	0800 026 4666	0800 585 058	01752 201 901	01536 495 000	0191 255 3000	01372 727 274
URL	www.dosh.co.uk	www.quickbooks.co.uk	www.myob.co.uk	www.pegasus.co.uk	www.uk.sage.com	www.tassoftware.co.uk
Price inc VAT	£59.99	£99 (Pro £199)	£229.13	£99	£99	£149
Price ex VAT	£51.06	£84.26 (Pro £169.36)	£195	£84.26	£84.26	126.71
Accrual VAT	✘	✔	✔	✔	✔	✔
VAT cash accounting	✔	✔	✔	✔	✔	✔
Report designer	✘	✔	✔	✘	✔	✔
Invoicing	✘	✔	✔	✔	✔	✔
Pro formas/estimates	✘	✔ (Pro only)	✔	✔	✘	✔
Cheque printing	✘	✔	✔	✘	✘	✔
Integration with MS Office	✘	✔ (Pro only)	✔	✘	✘	✔
Job costing	✘	✔ (Pro only)	✔	✘	✘	✔
Spreadsheet-style editing	✘	✔	✘	✘	✘	✘
Ease of use						
Transaction entry	Good	Good	Good	Fair	Good	Fair
Access to data once entered	Good	Good	Good	Poor	Fair	Good
Error correction	Good	Good	Good	Poor	Fair	Good
Help	Good	Good	Good	Poor	Fair	Fair

Choosing the right package

Obviously an important consideration when choosing a particular package is whether it can grow with your needs. It is generally a good idea to buy a more powerful package than you need to begin with, unless that product has a much steeper learning curve. You don't initially have to use all its facilities and it will negate the need to learn a new package at a later date. That said, if you buy from a company with a range of products, learning a new product is generally less of a problem.

Transferring data from one package to another is not as important as you might think, as long as you change packages at the end of a financial year. However, you could run into problems if the end of one of your VAT returns does not coincide with the end of your financial year. When buying, bear in mind both the cost of the package and how much it would cost you at a later date to upgrade to that publisher's higher-end software, and whether you will need to pay for extended technical support.

If you buy Instant Accounting now, you could upgrade to Sage Line 50 when you need more power

It is a good idea to get a demonstration disc of the software and work with it, entering transactions for an hour or two. Only then will you have a feel for the software. After all, different businesses have different needs: some have only a few, large, incoming payments from customers, but hundreds of small payments to suppliers. For them, it doesn't matter too much if invoicing takes a long time, as long as entering purchases can be done quickly.

It's sensible to ask your accountant for advice. If they are used to your package, they may be able to help you and they may even be able to work with your software producing end-of-year accounts.

Unlike their publishers, we are reluctant to recommend the personal finance packages for business use. Get a package designed for your size of business. DO$H CashBook is ideally suited to the one or two-man band that doesn't deal with stock and would rather leave invoicing to a word processor. CashBook fits the bill because, for this size of business, it is likely to be the proprietor doing the accounts. No doubt they will not have studied accounting and would rather have a package they can use straight out of the box. The other business products are all powerful, but it's sensible to check whether they work in the same way as you do.

Editor's **Choice**

In the small-business sector, most users are not trained bookkeepers and generally do not employ consultants to install the software or provide training. Ease of use is therefore paramount. Everyone knows how a paper invoice or cheque works, so it makes sense for the software's windows to mimic their paper-based equivalents. Speedy data entry is also important, which is why the DOS accounting market survived for so long, but software vendors have realised that Windows software can be just as productive.

Quicken and Microsoft Money both have pretensions of being suitable for business users, but unfortunately we felt that they weren't geared up to the job. Unlike the dedicated packages, the interfaces were designed without the business user in mind and the tiny amount of manual space dedicated to business accounts means that users are inevitably going to get stuck. That said, both personal finance programs could teach the business products a thing or two about data entry. They both let you enter transactions down the page in their registers, just as you would if writing in a paper cashbook. While we liked the use of dialog boxes that looked like cheques and invoices in the business packages, we would also have liked the option to enter transactions as with Quicken and Money. QuickBooks came nearest to this, but the register it offers is cumbersome for VAT-registered businesses.

The winners

The six packages in this test each have their advantages, but one product stands out as a good all-rounder for the small business. That product is QuickBooks, which garners our **Editor's Choice** award. Entering transactions was faster than in the other packages, so we really would agree with the name QuickBooks.

The in-product help was unrivalled and the software really was easy to learn. This is mainly because QuickBooks has gone to extreme lengths in order to hold the user's hand when setting up the software. The package was also one of the more powerful on test, offering fully-integrated payroll, the most comprehensive integration with Microsoft Office, emailing of invoices and an integrated currency calculator.

The **Highly Commended** award is given to MYOB Accounting, which was marginally easier to operate than QuickBooks, but has slightly slower data entry and lacks some of QuickBooks' more exotic features. The software even helps you find which tool you should be using thanks to its Command Centre, which shows what to do with the use of flowcharts. Integration with Office was a bonus, along with integrated payroll.

A special mention goes to TAS Books Accounting which just missed out on an award. It was the most powerful of the group and we particularly liked its clear interface and the ability to produce invoices in Microsoft Word. It was the only package to ask for two dates for each entry, providing the best solution to the problem of posting invoices in the wrong period. At £149, it costs less than either QuickBooks Pro or MYOB, making it terrific value for money.

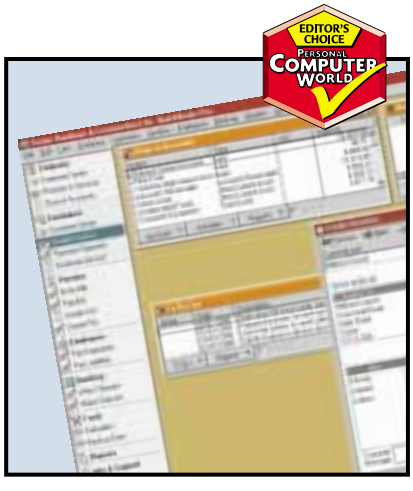
We felt that Pegasus Capital Lite is dated and, while it has a strong heritage and a good upgrade path, it fails to provide the same level of ease of use as its competitors. Its Windows 3-style interface suggests that Pegasus is not investing enough in the package's development.

It makes little attempt to explain or bypass accounting jargon, which makes it more appropriate for businesses employing trained bookkeepers. The software is also difficult to set up initially and an owner or manager is unlikely to have the understanding or the patience to do this themselves.

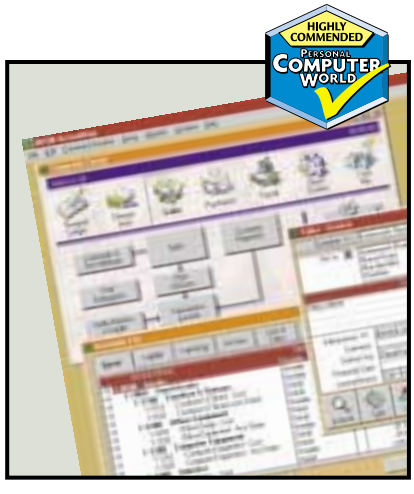
Sage Instant Accounting is a good package, particularly for businesses that think they may need to upgrade to Sage Line 50 at a later date. It has a clinically-designed interface, but is not as easy to use as MYOB or QuickBooks, nor is it as powerful. We liked Instant Accounting's use of wizards, which, among other things, made setting up new customers easy. Sage is a popular product range with accountants which means Instant Accounting would be a fine choice.

By a long way, the easiest package to use was also the least powerful – DO$H CashBook. We were impressed that it could be up and running within a matter of minutes and, when you consider that it only has four main windows, it is great for the computer-wary. Combining this with its first-rate manual, low cost and the fact that Lloyds TSB is including it as part of its new business package, CashBook's already popular following can only grow. It does not offer the functionality of the other programs, but its low price does mean there is no great loss if you need to upgrade to a different package later.

Overall, accounting software, which was once seen as the preserve of trained bookkeepers, is now straightforward enough for anyone to use. Nevertheless, it is important to try some of them out to find out which one best suits your way of working. Business accounting software still has a way to go before it has nailed the usability factor. For example, apart from QuickBooks, the business packages require every transaction to be entered into on-screen forms, which is friendly, but it would be better if simple purchases and sales could be entered into a spreadsheet-style list, as you can in the personal accounting packages.



QuickBooks 8: a good all-rounder for small businesses that lives up to its name



Lacking the exotic features of its rivals, MYOB Accounting proved an easy package to use

hands on

If you're into PCs, it's likely that you can't help tinkering about with hardware and software. Maybe it's a result of watching too much *Blue Peter* in your youth.

In this month's **Hardware** column you can relive those *Blue Peter* memories, as Gordon Laing shows you how a piece of string can come in useful for overclocking (p248).

There's more tinkering in our **Workshop** where Tim Nott explains how to personalise Windows using the WindowBlinds software (p234).

For those who are fed up of messing about with the compatibility problems of **Windows 2000**, Terence Green shows you how to safely retreat to the comfort of Windows 98 (p240).

Metacreations may have dumped its graphics products, but it's trying hard to establish its Metastream 3 plug-in as the Shockwave of **3D Graphics**. Benjamin Woolley takes a look and is impressed by its standards-based XML approach (p260).

In our brand new **Ecommerce** column, Nigel Whitfield shows you how to acquire and install a certificate for your web server to allow secure transactions (p269).

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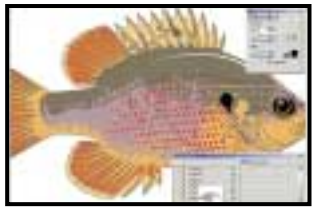

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Advice from our experts

Got a problem? Our *Hands On* columnists answer questions and solve your problems.

Windows

Q *How can I get Outlook to show – and print – the day as well as the date in weekly view? I've trawled through the Help file and countless unintelligible options, and can do everything except for this simple task.*

Sam Crowther

A Microsoft does give you a clue to this in the Help file, but as it's in a footnote to 'Displaying the Japanese year', I'm not surprised you couldn't find it. And it's one of those 'trick questions' so dear to Redmond, where the answer isn't where one would expect it to be. You have to go to Windows Control Panel, Regional Settings. In the Date page, set the long date style to 'dddd d MMMM yyyy'. Click on Apply and Outlook will display weekdays as well as dates. You can experiment with the date format – 'ddd', for example, gives 'Mon' instead of 'Monday', and 'dd' instead of 'd' adds a leading zero to a single-figure date.

Control Panel holds the key to Weekdays

Q *For no apparent reason, I can no longer start IE5 – when I click on the icon I get a message telling me that I am 'trying to install Internet Explorer version 5.0 or earlier on Windows 98. Internet Explorer is already part of the operating system. Installing an earlier version... will not allow the operating system to function properly'. I'm not trying to install anything – I just want to use the version that came with Windows 98 SE, as I have been for several months.*

Frank Davies

A This sounds as if something has made a half-baked effort to replace IE5 and has overwritten the shortcut. If you type 'Iexplore' into the Start, Run box, you should find that Internet Explorer starts normally and will also mend the damaged shortcut.

Q *On the context menu for all folders I have the entry: 'Add to playlist'. This was left by an audio player (Sonique) and was not removed when the program was uninstalled. It cannot be removed from the Folder options, File types, File folder entry, because the remove button is greyed out. Is there a Registry key that I could delete to get rid of this annoying entry?*

Khalid Hussain

A Yes – having made sure you have a recent Registry backup, run regedit and go to HKEY_CLASSES_ROOT\Directory\Shell. There you'll find the 'Add to playlist' key (a folder icon in the left pane) which you can delete.

Q *How can I stop my computer trying to dial up my ISP every 10 minutes?*

Steve Dickens

A This could well be because Outlook Express (or Outlook) is set to check for new mail at 10-minute intervals. You can turn this off from the Tools, Options, General dialog in Outlook Express, or Tools, Options, Mail delivery in Outlook 2000.

So THAT's who keeps phoning home...

Q *Is there any way to save the settings in the Find results box? It always seems to display the results in a box which is too short to see more than three results and too narrow to see the file details, and I grow weary of resizing it each time.*

Grace Mullen

A No – this is one of those irritations we just have to learn to live with.

Spreadsheets

Q *There must be a way to reset the working area in a similar fashion to selecting the print area, but I can't find it. Deleting 65,000 rows is not a viable option.*

Roy Gregory

A If you use any cell beyond your last active cell, Excel automatically redefines the work area. The normal solution is to delete all the columns, then all the rows, between your preferred bottom-right cell and the stray one far away. Then Save, Close and reopen the file. Alternatively you can clear that alien cell and then use this simple macro:

```
Sub ResetRange()
ActiveSheet.UsedRange
End Sub
```

Q *How can I make an Excel macro become available in any new or existing workbook that I open?*

Babs Lee

A Copy the VBA for Excel listing into a file called Personal.xls and save it in the \Xlstart directory which is probably in the path: C:\Program files\Microsoft Office\Office\. That workbook will automatically open when you start Excel and its macros will be available while this file remains open. Bear in mind also that, unlike Word, Excel does not maintain a link between a workbook and the template you use to create it. If you add or edit a macro in an Excel template, it's only available in workbooks you later create from that template.

To the max... shortcut to bigger windows

Q *I know about starting Excel using the startup switch /I, but how do I get a particular workbook launched via a shortcut to start in a maximised window?*

Ben Cuncliffe

A Right-click on the shortcut, choose Properties and in the Run dropdown box choose Maximised.

Word Processing

Q *Is there any way in Word to search for tabs followed by numbers (not characters) and vice versa?*

Jane Crookes

A Yes – you'll find these on the 'Special' list in the Find dialog – you may first need to click the 'More' button. Use ^t^# to find tab-number and ^t^$ for tab-letter.

Q *I need to create a Word document template where a person's name has to appear in several places. How can I implement this but only ask them to type it in once?*

Paul Anderton

A There are several ways to do this – the easiest and macro-free way is by using fields. Create a new template and add whatever standard text you need. For the first occurrence (in fact it can be anywhere in the document) of the name insert a FILLIN field with the prompt: 'Please type in your name'. This will produce a little dialog box containing a prompt and a space to type. Cancel it for now. Select the field, Insert, Bookmark, then give it a name – let's say 'Username'. Now go to the next place you need the name to appear and insert a REF field followed by the name of the bookmark, and repeat for subsequent occurrences. Save the template.

When any new document is created from this template, the 'Please type your name' box will appear – when the user does so, and clicks on OK, the name will appear at all the designated locations.

Never forget a name using REF and FILLIN

Hardware

Q *How do digital cameras fare when subjected to X-ray or similar security checks at airports? Also how well do they put up with unsympathetic handling or cold and wet conditions?*

David Bownes

A Putting digital cameras through X-ray machines is as safe as doing it to notebooks, so unless you see a 'no computer' sign, then there shouldn't be any problems. However, the digital camera's many electronic circuits do not like getting wet one bit – check with the manufacturer for humidity and temperature information. Remember also that batteries don't last as long in the cold and that most digital cameras only get a couple of hours per charge, even under ideal conditions.

Q *We have a large database system and are contemplating upgrading our pair of IDE drives to Ultra160 SCSI. What controller should I be looking at and are the devices as simple to fit as IDE drives?*

Matthew Hirst

A In terms of installation, SCSI is as straightforward as IDE. Just make sure each SCSI device has a different ID number and that the ends of your SCSI chains are terminated – the interface card will have instructions.

If you intend to boot from SCSI, your motherboard BIOS will need to know. With up to 15 SCSI devices talking at once, the higher bandwidth of Ultra160 SCSI over a maximum of four devices under UltraDMA66 becomes clear. For the greatest benefit, buy a pair of either Ultra2 or Ultra160 drives and connect them both to the LVD connector on, say, an Adaptec 29160 card. Connect any non-Ultra2/Ultra160 SCSI devices to the 29160's other ports as instructed.

Q *Can I upgrade the 500MHz Socket 370 Celeron that my laptop runs on? Also, can you change the FSB (front-side bus) speed on a laptop?*

Sebastian Guest

A The new 566MHz Celerons – and above – employ an FC-PGA design, which is probably incompatible with your notebook's PPGA socket, and it'll be too cramped for an adaptor. Also, even if you could increase the FSB, you would be overclocking your Celeron close to or beyond the limits of its manufacturing process. Consequently, it looks like you're stuck with your 500MHz chip.

Q *I have an ATA33 and ATA66 hard disk. Will the ATA33 hard disk affect the performance of my ATA66 drive on the same channel? If so, should I put my ATA33 drive on the same channel as my CD-ROM drive, which it is currently sharing with an LS120 drive?*

Peter M Pascoe

A Putting an ATA33 drive on the same channel as an ATA66 drive will force both to run at the ATA33 spec. Then again, this is still preferable to putting a hard disk with a CD-ROM drive on the same channel. Also, remember that even if both hard disks are going flat out, they'll still be comfortably within the ATA33 maximum bandwidth. If you've already got four IDE drives and fancy more, consider buying an UltraDMA66 PCI card, which will give you an additional pair of channels.

Linux

Q *My company is interested in developing a specialist application around a free software operating system such as Linux or FreeBSD, used as an embedded platform. The problem I have with Linux is that – as I understand it – the licensing agreement demands that any application that is part of the system must also be supplied as source code. It would be out of the question for my company to sign up to something like this, as we are always careful to keep our proprietary algorithms secret.*

John Jury

A The licences for GNU/Linux and FreeBSD are very different. The FreeBSD licence is very loose and basically just insists on the copyright notice being maintained. The GNU licence is stricter (or freer, depending on your point of view), its main aim being to ensure that work contributed by volunteers isn't hijacked by commercial organisations distributing closed source software for profit.

However, whether the GNU Public Licence (GPL) applies to your own changes to GNU/Linux will depend on what you mean by 'part of the system'. If it's just something you're using in-house you can do what you like with it. If you're distributing a complete Linux system commercially, or offering software commercially that runs on Linux, any software of yours that incorporates GNU code will also have to be open.

Note that this doesn't apply to code that only uses existing GNU sharable libraries, most of which are now covered by a less strict licence (the Lesser GPL, or LGPL). And, of course, it's allowable to include independent software applications under the terms of your own licence in the way that WordPerfect, for example, is distributed with Linux.

FreeBSD just asks for copyright recognition

Two houses both alike in dignity, but with very different licensing terms and philosophies. The home of the GNU (GNU's Not Unix's) project is www.gnu.org and www.freebsd.org is the site of the closest free software competitor to Linux.

Windows 2000

Q *I'm a student in a shared house with four networked computers, but I've hit some problems since two Windows 98 computers were upgraded to Windows 2000 Pro. Now they can see each other but not the Windows 98 ones. Clicking on the other Windows 2000 computer in Network Places only produces a cryptic password request.*

Paul Urwin

A There are two ways to solve the password problem. Enable the Guest Account on Windows 2000 or add Create User Accounts for the Win 98 users on the Win 2000 computers.

To enable the Guest Account, open Users-and-Groups in Control Panel, go to the Advanced tab and click on the Advanced button under Advanced User Management. This opens the Local Users and Groups console. Click on Users and right-click on the Guest Account (it will have a red cross) to open Guest Properties. Deselect the 'Account is disabled' checkbox. Enabling Guest makes Win 2000 wide open like Win 98. If this is an issue, create user accounts for the Win 98 users on each Win 2000 Pro system. In the right-hand pane of Local Users and Groups/Users, right-click to create new user accounts for the people using Windows 98. Make the account name and password the same as those used to log in on the Win 98 systems.

NetBIOS is required for Win 98 and Win 2000 computers to browse together. On a small network such as this, NetBEUI will work fine but multiplayer games need IPX or TCP/IP. If either of these protocols is used instead of NetBEUI, enable NetBIOS from the respective protocol's advanced properties in Win 2000. All computers must run the Microsoft Client for Networking as well as File and Printer Sharing. On the Win 98 boxes, enable 'I want to share my files' (File and Printer Properties).

Graphics & DTP

Q *I've recently upgraded from Adobe Photoshop 4 to 5.5. I often do retouching work on quite large files, A4 and larger at 300dpi and progress can be slow. Version 4's Quick Edit feature let you work on a small section of an image and then import it back into the larger main image. But this feature isn't present in version 5.5. Is there a plug-in available, or a workaround?*

Isabelle Risner

A Quick Edit is still there, it's just been moved to the optional filters folder in the goodies folder on the Photoshop 5.5 CD. Just drag the QuickEd.8BP file into the Photoshop 5.5 plug-ins folder on your hard drive.

Quick Edit lets you work more efficiently on small bits of big files in Photoshop 5.5

Q *We use QuarkXpress 4.1 to produce an advertisement page for several publications with different page sizes. They don't vary by much, usually no more than 30mm on the depth or width of an A4 page. Is there a simpler way than manually adjusting the advert every time?*

Martin King

A Save the page as an EPS, create a new document the required size and use the rectangular picture box tool to draw a box the exact size of the page with the top left corner at 0,0. Get picture (Control & E) and then press Control & Shift & F to make it fit the box. You'll get slight squeezing or expansion if the new page size isn't the same proportions as the original, but nothing too drastic.

CONTACTS

All of our experts welcome your queries: simply respond to the appropriate address at the end of their *Hands On* columns.

Make it personal

Tim Nott shows you how to use WindowBlinds to customise the Windows desktop.

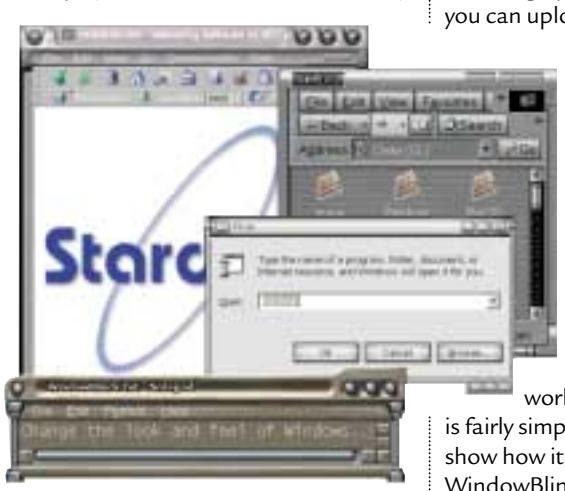
One of the most satisfying – and time-consuming – activities available to Windows users is messing around with the interface. Whether it's experimenting with the settings and colours in the Display Properties, or customising the look with Registry tweaks, it's a subject that seems to be a firm favourite with *Hands On*, *Windows* readers. Despite the possibilities on offer, you'll eventually run into the wall of limitation. Buttons have to look as Redmond ordained, title bars can offer no more excitement than shaded colouring and, most restricting of all, windows have to be rectangular.

This all started to change with the rise in popularity of digital jukeboxes. Not only did their creators design them to mix playlists of varied digital music formats and CD tracks but, in true musical style, they also broke away from the square. Players such as WinAmp, MusicMatch and RealPlayer are full of svelte curves and slide-out controls. Others, such as Earjam, Soritong and Sonique, look like pieces of alien jewellery. The common factor is that they can all use alternative 'skins'. In other words, they can be totally changed in appearance by anyone prepared to download these skins or design their own. Now, even Microsoft has joined in with Windows Media Player 7.

Stardock's WindowBlinds takes the skins concept and applies it not just to a single application, but to the whole of Windows. Practically anything you could want to customise can be customised, including window frames, dialogs, buttons, scrollbars, toolbars, the taskbar and more. It also adds extra functionality – if you want a clock, a button to start the screensaver or one to keep a window 'on top', then all these can be added to a window's fixtures and fittings. You can even animate components of a window or add buttons that play sounds. Best of all, it can add transparency to window components, so it's not a square world any longer.

In this workshop we're going to keep it relatively simple and show you how to create a custom window look.

A skin – also known as a personality – consists of a folder containing a set of bitmaps (and sometimes other resources), together with a UIS file, which is the glue that holds all the bits together in the correct positions. This is a plain text file that can be edited in Notepad.



Stardock's homepage is a great source of skins. You'll find one for every occasion

Much as in a Windows .INI file, section headings are enclosed in square brackets and each section consists of a series of entries of the form Keyword = value. There are two versions of the UIS standard – we'll be working in the later, more powerful UIS2, which has advantages such as a Preview feature.

It can add transparency to window components, so it's not a square world any longer

Typically, each image file contains more than one version of the image: window components, for example, have both active and inactive versions, and button images can also contain several states. All of the image files, along with the UIS file, need to be stored in a subfolder of the WindowBlinds folder, irrespective of where the latter is located. This has two benefits: first, it means that you only need to specify the subfolder and file in the UIS entries. Second, it means that personalities are portable, as no absolute paths are involved. If you want to go public with your personality, you can upload it to www.skinz.org or www.stardock.com/wb/upload.asp. Put the UIS and all the graphic files into a Zip, which should have the same name as the UIS file.

Stardock also produces a utility called Builder Blinds to automate the production of the UIS file – again this is available as a free trial. We've stuck to plain old-fashioned text editing in this workshop as, first, our example is fairly simple, and second, we wanted to show how it all works. A copy of WindowBlinds trial version – together with all the files used in our workshop example – is included on this month's cover disc.

Health and safety

WindowBlinds makes no changes to your system files and so has no impact on the system unless it is running: by default it is loaded on Windows startup but this can be switched off from the Startup Settings tab.

WindowBlinds – or a particular skin – may clash with certain applications and we found it could also cause display and performance problems at times. If you're experimenting with a skin, don't have mission-critical work going on at the same time and save your bitmaps and UIS file frequently.

Applications that don't get on with WindowBlinds can be added to an 'exclusion list' and will then run normally, remaining in their standard Microsoft uniform. You can stop a program from using skins on a one-off

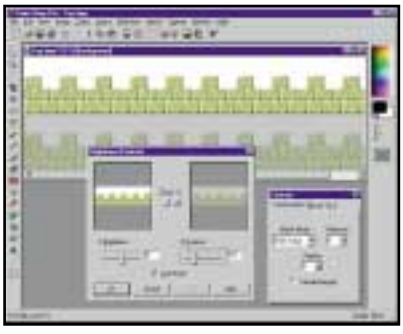
Step-by-step guide to customising your windows

1 We're going to create a simple personality that has a customised window title bar, frame and buttons. We'll be making the most of transparency, as this shot of both the components and the finished product shows. The window is made up of five bitmaps – the top, bottom, left and right sides and menu bar. Note that the top is sandwiched between the sides, rather than sitting on top of them. Five more bitmaps are used for the buttons.

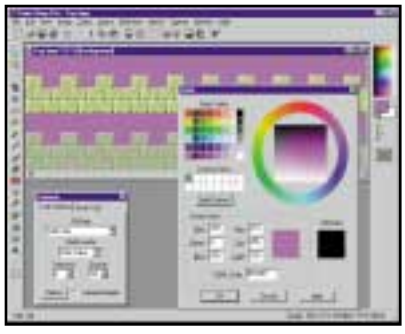
2 Before we get down to the creative bit, there are a few formalities to observe. First, we need to create a folder to hold the skin. In this folder we need to create the .uis file in Notepad. For simplicity's sake these are both named Castle. We need to identify the personality in [TitlebarSkin] with the SkinName and SkinAuthor. These are both necessary for the skin to appear in the WindowBlinds list.

3 We can now start the artwork for the window title bar. First, we created a new image 252 pixels wide by 36 high, with 16 million colours and white as the background colour. Next, we drew a 12 x 8 pixel beige block, selected it and added Noise from the Image menu to give the block some texture. Then, using the Lighten and Darken retouch tool and a single-pixel brush, we traced over the edges to get a bevel effect.

4 With one block hewn, we can use the medieval technique of building the wall a stone at a time with the Paste as New Selection (Ctrl & E) command, then saving as TOP.BMP. We now need to create the inactive title bar, which needs to be a same-sized image below the original. To make room for this we set Paste Shop Pro's background colour to white, then went to Image, Add Borders and added a 36-pixel border to the bottom only.



5 Having selected the added area with the Magic Wand tool – making sure the tolerance is zero – we then went to Selection, Invert followed by Edit, Copy. We inverted the selection once more, then Edit, Paste, Into Selection. We now have two identical title bars. With the bottom copy still selected, we went to Colors, Adjust, Brightness/Contrast and changed the brightness and contrast so that the selection was suitably dulled for 'inactive' use.



6 The final touch is to apply the transparency. Having cancelled the selection, (Control & D) we double-clicked on the foreground swatch in the colour palette, and set its value to 255, 0, 255. This rather virulent shade will become transparent when displayed by WindowBlinds. Using the Flood Fill tool set to zero tolerance and flat colour, we filled the white and grey areas.

(Turn over for steps 7-12)

basis, by holding down the Control key when launching it.

Paint Shop Pro

In addition to WindowBlinds itself and Notepad, you will need an image editor. We've used Paint Shop Pro, which is widely available as a free trial. Although this isn't intended as a Paint Shop tutorial, there are a few essential tips that will make bitmapping a great deal easier and quicker.

● Don't be afraid to zoom – you really need pixel-perfect accuracy, especially when editing the buttons. Instead of constantly swapping between the painting and Zoom tools, use the + and – keys on the numeric keypad, or, if you have one, the mouse wheel.

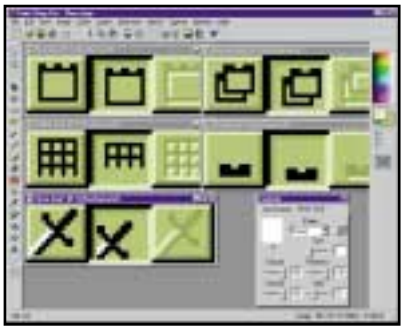
● The Dropper tool is excellent for changing the brush colour to one already in the same (or another) image. Again, you don't need to swap tools – hold down Control with a painting tool selected, and it will temporarily change

Customising your windows (continued)

7 We used a similar sequence of techniques to build the sides, starting with a 15 x 180 bitmap. To make the towers seem round, we shaded them by adding a new layer, giving this a linear white-to-black gradient, and then reducing the layer's opacity. Since the sides are handed, we saved LEFT.BMP, then used some judicious copying and pasting to create RIGHT.BMP, before adding the inactive versions (on the right) and transparency as per steps four, five and six.

8 Having created MENU.BMP (252 x 15) and BOTTOM.BMP (252 x 8) we filled these with plain colour and a single row of pasted blocks respectively, before repeating step five to create their inactive versions. Now we are ready to tell WindowBlinds what to do with these in the UIS file. In the [Personality] section we can now define the values of Top, Bottom, Left, Right and Menubar. Having saved CASTLE.UIS, we can now preview the skin in WindowBlinds.

9 As the preview showed, we have a few problems. We need to move the title text down into the non-transparent part of the title bar and stop the tower roofs repeating. TextShiftVert = 20 achieves the former: we've also forced the text colour to black with the ActiveTextR (GB) entries. The following section defines the areas of the bitmaps that won't be affected by resizing. Setting LeftStretch = 0 forces tiling, rather than stretching, of the remainder.



10 That gave us a much better preview – note that the TopTopHeight and TopBotHeight settings refer to the left and right portions of TOP.BMP and allow a more graceful repeat of the battlements. We now need some buttons. Buttons come in sets of three to a file, showing the normal, depressed and disabled states. We've used standard-sized buttons (16 x 14 pixels), so each bitmap is 48 x 14 pixels, split into three horizontally and suitably medievalised.

11 Next we add ButtonCount = 5 to the [Personality] section. Then each button has its own section. [Button0] has its top left corner positioned 36 pixels in and 21 down from the top right (Align = 1). Its image is CLOSE.BMP and it performs Action = 0, ie, closing the window. [Button1] and [Button2], which both have the Maximise/Restore action, occupy the same space but not at the same time, as the Visibility setting swaps them between normal and maximised windows.

12 [Button3] should now be self-explanatory, but [Button4] has a special WindowBlind action – it 'rolls up' the window into its title bar. To use this we need to define the rolled-up size with RollupSize = 36 in the [Personality] section. We've moved this special button left of the title bar with Align = 0 and Xcoord = 20: we've also had to add a TextShift = 30 entry to the [Personality] section to move the title text out of the way.

to the dropper. You can then 'pick up' a colour from anywhere you want.

● The Tolerance control is especially useful when using the Magic Wand, Flood Fill or Colour Replace tools. If you set it to zero, only pixels of the same RGB values will be affected. Increasing the tolerance increases the colour range – 100 per cent affects all colours.

● A fast way of copying and pasting a selection is to hold down the Alt key while dragging – this copies, rather than moves, the selected area.

● Many effects, such as the 'Add noise' and 'Brightness/Contrast' used in the workshop, have an Autoproof button. Check this for a preview of the effect.

CONTACTS

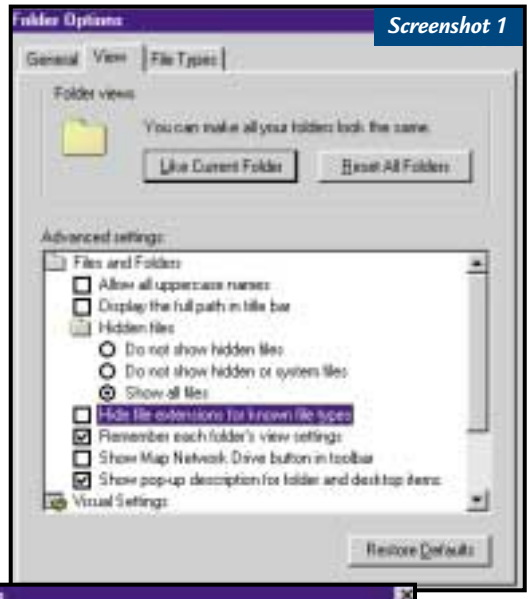
Tim Nott welcomes your comments. Contact him via the *PCW* editorial office or email **win@pcw.co.uk**

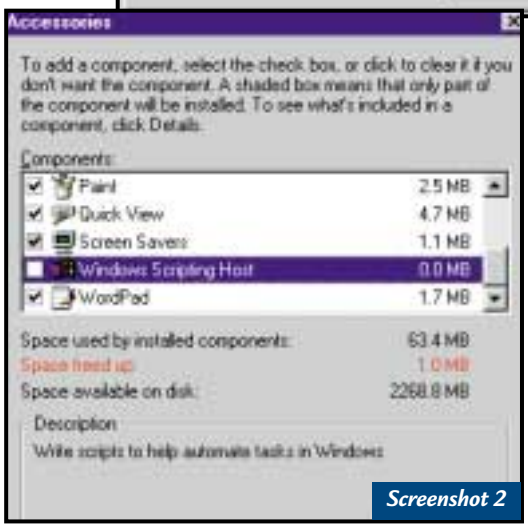
Breaking hearts

Tim Nott sidesteps the perils of love letters and other strains of the virus by disabling scripting.

At the time of writing, another email virus scare was doing the rounds – this time the ILOVEYOU virus. This one wasn't a hoax and perhaps because of its name – dubbed the 'Love Bug' – it was treated by the media with that kind of almost affectionate awe normally reserved for hurricanes, earthquakes and similar natural disasters. Within a day or two it had, allegedly, caused more than £6b worth of damage and copycat viruses, such as 'Mother's Day' and 'Joke', had rapidly joined the mayhem. The damage was done by an attachment described as a love letter, with the name LOVE-LETTER-FOR-YOU.TXT.VBS.

Regular readers with long memories might recall that in May and June last year we covered the Windows Scripting Host. To recap briefly, this optional feature of Windows 98 lets you use Visual Basic or JavaScript files to automate processes and carry out tasks that can't normally be done in Windows – one example we looked at was a sequential mass renaming of files. Script files (JavaScript files have the .js extension, Visual Basic have .vbs) can also do other, not-so-useful things, such as destroy data and propagate themselves. Note that LOVE-LETTER-FOR-YOU.TXT.VBS appears to have two extensions – it's the final one that counts and, depending on your settings, it may not be visible.





Top: Keep informed – don't hide file extensions
Above: Protect yourself from rogue scripts

At the simplest level, a script can create a text file. This might seem harmless – but scripts themselves are 'just' text files, albeit with a .js or .vbs extension. And any script file present in the Startup folder will be run the next time you restart Windows. As far as malicious code goes, this is just the beginning. The ILOVEYOU virus renames and replaces files, propagates itself by using your Outlook address book, and changes the home page in your browser in an attempt to download another executable file. The one thing it doesn't do is love you and, if you pass it on, the recipients certainly won't either. Like all attachments of uncertain provenance, it should be deleted unopened.

James Cross emailed me with a rather neatly targeted prophylactic measure. If you are using Outlook or Outlook Express, create a new message rule from the Tools menu, so that any message with ILOVEYOU in the subject line gets deleted unread. Some mail servers will also let you delete the mail from the server without downloading it, which is even better, and is again possible using Outlook Express rules.

Outlook 2000 users get a few more options – such as performing an action on all messages that have attachments. They can also set up a notification that the message has been received and deleted, but, rather paradoxically, unless you choose the 'permanent' delete option this notification provides a shortcut to opening the message (and attachment) from the deleted folder.

Even better advice is to take the simple precaution of never opening potentially unsafe attachments. It's a source of constant amazement that otherwise intelligent people who practise safe sex and refrain from using their fingers to test electric sockets will cheerfully unleash havoc on their own – and others' – computers.

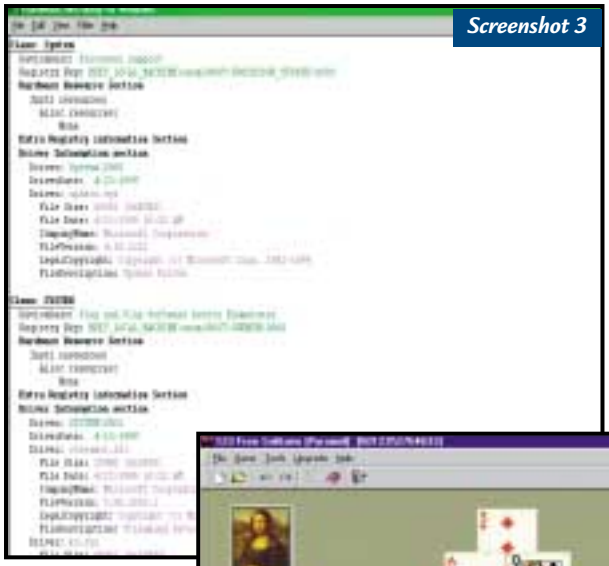
There are other elementary precautions you can take. Using virus protection software is the obvious one, but don't rely on this: virus writers consider getting past such obstacles a noble challenge and, however often the checking software is updated, it can't hope to keep pace with new strains the moment they appear. Another sound strategy is to turn off 'Hide file extensions for known types' in Explorer, View, (Folder) Options, View. This way you have less chance of being taken in by a VBS wolf in TXT sheep's clothing, and also have a better chance of knowing the enemy (screenshot 1).

As already mentioned, anything with the VBS or JS extension should be viewed with extreme suspicion: if you have reasons for believing such a file to be harmless, you can check by loading it into Notepad (right-click, Edit NOT Open). Anything with the BAT, COM or EXE extension is also potentially harmful: these all run program code of one form

or another. Although you can't do a lot about the last three, if you don't need Windows Scripting, you can thwart the VB and JavaScript threat by uninstalling the Windows Scripting Host from Control Panel, Add/Remove programs, Windows Setup, Accessories (screenshot 2).

You should be safe with real TXT files, as with image formats such as JPG or GIF, and sound files such as WAV or MP3 – even if the contents aren't what they purport to be, the worst they could do is crash the program associated with them. However, at the risk of being repetitive, do check that these extensions are the real thing and don't precede another, hidden, extension. This is another trick of the ILOVEYOU virus: reproducing by copying itself over existing MP3 files.

Office documents, such as DOC, XLS and PPT files can all contain macro code: Office 2000 has options to disable macros in unknown documents, which you should use, and this safeguard is also available as a patch for Office 97.


Screenshot 3


Screenshot 4

Left: Everything you never wanted to know about your hardware setup
Below: Not the only game in town – Pyramid from 123 Free Solitaire

Screensaver (SCR) files are also potentially hazardous, as these consist of executable code: if you rename an EXE to the SCR extension it will still run. Finally, don't assume that messages from friends are safe: this is exactly how viruses propagate as victims unwittingly pass the infection on to people in their address book.

Don't assume that messages from friends are safe: this is exactly how viruses propagate

Star turn

Please don't try this if you're in a hurry, especially if you have a large hard disk and/or a slow PC, but selecting an item (such as My Computer) in the left pane of Explorer, then hitting the asterisk key on the numeric keypad, expands every nested folder below. Thank you, Ian Ratcliffe, for bringing that to my attention, and I was particularly impressed by the way the scroll bars animate.

Last month I mentioned both the Accessibility features of Windows and the annoyances of hitting the caps lock key by mistake. Alan Hitchin ties these neatly together by pointing out that there's an option in the former to sound a beep when the Caps lock, Scroll lock or Num lock keys are pressed.

If you would really like to get to know your Windows 98 hardware setup with clinical intimacy, then try typing HWINFO /UI from the Start, Run box. This will tell you everything you ever wanted to know (and probably lots that you didn't), from your CPU-PCI bridge to your joystick. This is all displayed in a range of designer colours – mauve for file Properties, green for Registry entries, brown for Configuration Manager, blue for warnings and red for problems (screenshot 3). Thank you, Philip Branley for pointing me towards this.

In May's Windows column I wrote about Direct Cable Connection and mentioned that you couldn't use DCC and Dial-up Networking at the same time. Not so, says Duncan Grant: 'All you have to do is to add another MS DUN adaptor and another TCP/IP protocol into your networking setup.

Using TCP binding, you allocate static IP addresses for the DCC and bind that TCP/IP setting to your DCC adaptor and bind the second adaptor to the second TCP/IP protocol (which should be set to dynamic).

Furthermore, if you do this and install a proxy server on the host machine, then configure the guest IE to use a proxy with the ports you have set, you can indeed share the Internet using only the modem on the host machine.'

Playing with yourself

If you want to achieve a record-breaking score at Minesweeper, then holding down both buttons and pressing the Esc key stops the clock: you can still continue playing. You can also cheat at Solitaire if you're set to 'draw three' and the card you really want won't come to the top. Hold down Shift & Alt & Control as you click on the pile, and the cards will turn over singly. Even more sad and pointless is the Freecell cheat. Control & Shift & F10 gives you the option to win or lose immediately.

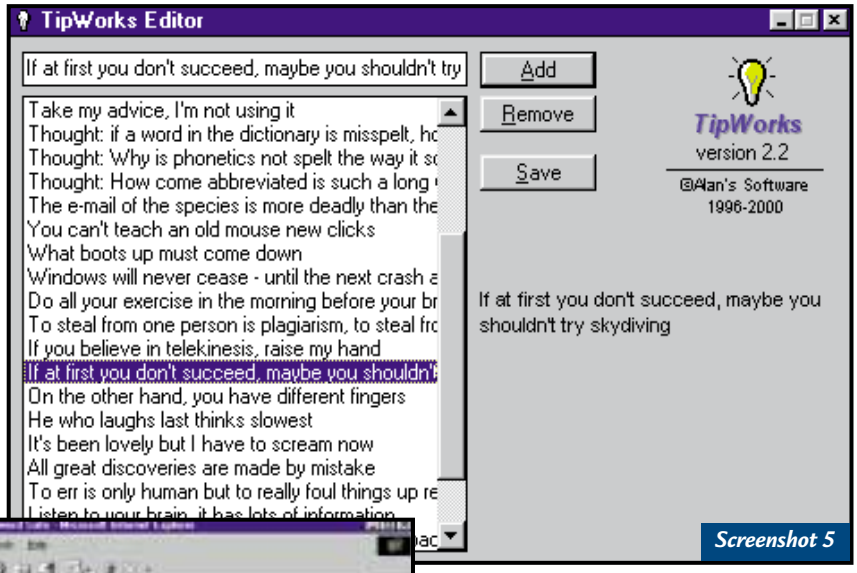
Which brings me to a related matter and some rather more interesting ways of wasting time: a reader wanted to know if it was possible to add custom bitmaps to the choice of card backs in Solitaire. I haven't been able to find a way – what you'd need to do would be to edit the file CARDS.DLL, which contains the backs – and fronts – of the Solitaire deck, including the animations.

You can also use this file as a resource

for your own card games that you've knocked up in Visual Basic, C++ or other programming language. On the other hand, why bother, especially as the Windows card games are somewhat dulled by age and custom?

While I was searching for an answer to the original question, I came across more free patience and other card games than you could shake a spade at. Two of my favourites are Midnight Sunitaire and 123 Free Solitaire. The first of these not only includes some truly dreadful jokes, but also a hidden ghost; the game itself is more interesting than most; champagne corks pop when you win. The second has less well-known patience variants and some classy backs, including the Mona Lisa (screenshot 4).

If you can stomach the in-game advertising, then try Free Solitaire (without the 123). This is a compendium of 10 games and has the feature we were looking for when we came in – using your own images as card backs. You'll find these (and many others) at www.freewarehome.com/games/cards.html and http://winfiles.cnet.com/apps/98/games-card.html.



Screenshot 5

Screenshot 6

Above: Welcome back tips of the day, courtesy of Alan Hitchin
Left: Online storage for all your passwords

Nostalgia isn't what it was

Remember the *Tip of the day*? Younger readers may not, but this was a feature that popped up with a hint or tip every time you started Windows 95 offering invaluable advice such as 'You can minimise neck strain by positioning your monitor at eye level' (where else?). When you'd got bored with this, you could turn the feature off, or better still hack the Registry and substitute your own tips.

At the time we had a lot of fun with readers sending in individual tips that ranged from the Pollyannaish ('If you see someone without a smile, give them yours') through to the cynical ('We are born naked, wet and hungry. Then things get worse') to the downright weird ('To err is human, to moo, bovine'). Others sent in entire collections, including several themed on cults such as *Twin Peaks*, *Discworld*, *Red Dwarf* and the inevitable *Star Trek*. And then along came Windows 98 and away went the tip of the day.

In a generous act of retro-development, Alan Hitchin has written his own tip-of-the-day applet, called TipWorks (sample: 'On the other hand, you have different fingers')(screenshot 5). Unlike the original Microsoft version, it doesn't store its tips in the Registry, but in its own folder and comes with a tip editor, so you can add your own favourites without enduring the horrors of Regedit. TipWorks is free, and at the time of writing, could be found at www.alanweb.co.uk/tipworks.

Safe keeping

In last December's column, I mentioned the problems of remembering and storing passwords securely.

If you go to www.passwordsafe.com, you'll find you can store all your passwords in a private, secure online safe (screenshot 6). Passwords are stored in category folders, such as Health, Email, Shopping and there is no limit to the number of passwords you can store. The service is free.

If, on the other hand, you have reservations about trusting a website with all your passwords, there are other utilities specifically designed to do this on your own hard disk. One such is Password Keeper, by Gregory Braun. This shareware product (registration is around £13) is available from www.gregorybraun.com, and has extra features such as launching a web browser with a password-protected site and generating passwords.

Either option leaves you with just one password to remember: as long as you can remember your user name and your mother's maiden name, Password Safe will email you a forgotten password from your personal safe. Which, perhaps, makes it rather less than secure.

CONTACTS

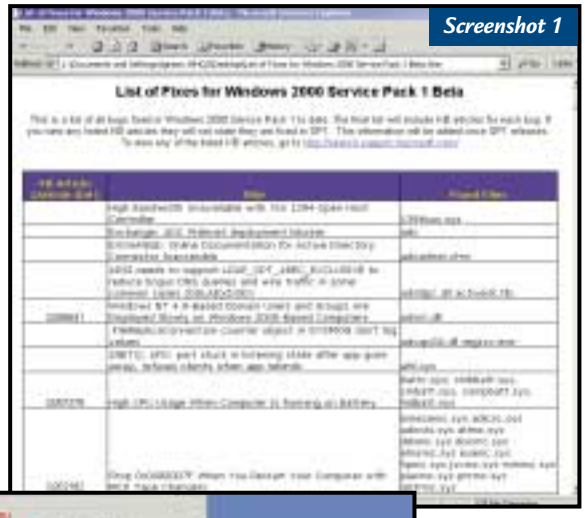
Tim Nott welcomes your comments on the Windows column. You can contact him via the *PCW* editorial office or email: **win@pcw.co.uk**. Please do not send unsolicited file attachments or queries concerning the *PCW* CD-ROM or website

The devil you know

Terence Green explains what to do if you can't live with the incompatibilities of Windows 2000.

June's article on Windows 2000 upgrades hit a nerve with several readers. Tony Penney has also been spending money. 'I too have been having a torrid time. First my SCSI adaptor, then my Zip and now my NIC. Where will it all end?' In blissful, reliable, harmony of course!

Although Windows 2000 is stricter than Windows 9x, we're in the 'honeymoon' period of getting to know our new partner. Any new relationship needs some mutual adjustment. Fortunately, hardware vendors are coming through with drivers, Microsoft has punted out another compatibility upgrade, (mainly for gamers), and the first Service Pack (aka bug fix) should be out around now (see screenshot 1).



Screenshot 1


Screenshot 2

Left: Service Pack, coming down the line, the answer to everybody's problems... Below: Free virus scanning software for personal use. Works great with Windows 2000

Windows NT Service Packs have resembled privatised trains: arriving eventually but haphazardly. Microsoft has promised to do better with Windows 2000. They should emerge on a six-monthly schedule and hopefully will address annoyances such as the Voodoo 2 problem and the lack of support for the Matrox G400 DualHead video card.

Video cards are a major source of irritation with upgraders, so I have borrowed a few – initially the ATi Rage Fury Pro and the Matrox, an Elsa Erazor is in the pipeline – to check them out. Although two monitors can be attached to the Matrox, Windows 2000 doesn't support any of the cool DualHead features. You get a bigger screen area, but both monitors run at the same refresh rate. Matrox has tried working around this, but to no avail, so we're all waiting for Microsoft to do the business.

As we've always said, it will take time for these general niggles to be worked out but when they are it will be worth the wait. Sadly, not everyone can manage with reduced functionality, or afford to upgrade their hardware. Some readers have asked about reverting to Windows 98. If you've upgraded from an earlier version of Windows to Windows 2000 your system folders are a mix of old and new and your best bet is to begin afresh with newly formatted drives and a new install of Windows 98.

We're in the 'honeymoon' period. Any new relationship needs mutual readjustment

The situation is a bit better if Windows 2000 resides on a separate partition in a dual-boot setup. Removing Windows 2000 entails disabling the dual-boot system and either deleting the Windows 2000 system files (if installed to a FAT partition) or deleting the NTFS drive on which Windows 2000 is installed. If your Windows 2000 partition is formatted as NTFS, you won't be able to access the NTFS partition to remove it from Windows 98 after disabling dual-boot. You need either the Windows 2000 CD or a utility such as PartitionMagic to remove the NTFS partition and reformat it for Windows 98.

From Windows 2000 check whether the Windows 2000 system drive is NTFS by right-clicking on it in My Computer and looking at the General Properties. Still in Windows 2000, back up your data, remembering to retrieve any files which may have found their way into the Windows 2000 Documents & Settings folder. Export your Internet Explorer Favourites and cookies (IE/File/Import and Export) to the C: drive (assuming Windows 9x is installed there). Use Tools/Maintenance/Store Folder to move any Outlook Express message stores to the C: drive. Run a virus scan on the C: drive to make sure that you don't have a virus infection in the boot sector. You can download a free virus scanner from www.antivirus.cai.com (see screenshot 2) or time-limited demos from other vendors.

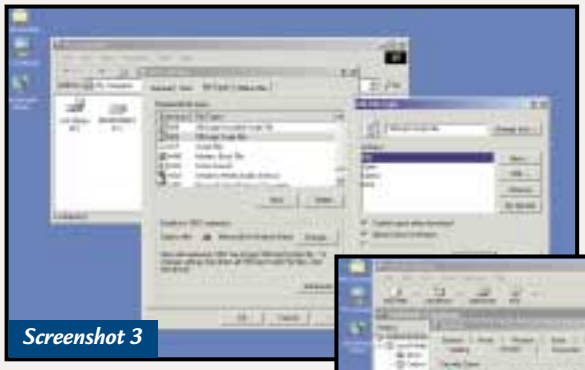
Boot into Windows 98 and make a Startup Disk (Control Panel/Add/-

Fending off amorous advances of the viral kind

At the time of writing there's a lot fuss about the Love Letter virus. Although it may have gone quiet by the time this appears, it will still be on the loose posing a threat. The Melissa virus of a year ago and the Pretty Park virus of six months ago remain at large. Do ensure that your anti-virus software is up to date. Downloading new updates once a week should do it. I use AntiViral Toolkit Pro (www.avp.ch) which offers daily updates for the truly paranoid. Obviously you should never open suspicious attachments, but we all make mistakes. Even folks at Microsoft fell prey to Melissa and Love Letter, and if it can happen to them...

There are several steps you can take to protect yourself, in addition to always using real-time anti-virus scanning. The principal problems are caused by Active Scripting which, once it gets loose on your computer, can do just about anything. That's how Love Letter did its dirty work, once activated by opening the email attachment.

The trouble is, in some cases scripting is a good thing. Please don't use the following instructions without obtaining approval from your IT manager if you're on a corporate network. If you're home alone or in a small business, be warned, script viruses can activate from within Outlook and Outlook Express without any user action.



Screenshot 3

Screenshot 4

Left: Stop Love Letters by setting the default action for Script files to Edit
Below: Raise the barriers to entry – set Outlook/Express to Restricted zone and disable Active Scripting

One solution is to change file associations so that scripts (files with extensions VBS, VBE, JS, JSE, and WSH) open in the Notepad editor rather than executing. Do this from Windows Explorer/Tools/Folder Options/File Types. Scroll to each extension in turn, click on Advanced, select Edit, click on Set Default and ensure that Confirm Open After Download and Always Show Extension are both checked (see screenshot 3).

Scripts can also be contained within HTML email or web (HTML) pages. For this reason it is probably better to cover yourself by using the Security Zone feature in Outlook, Outlook Express and Internet Explorer instead. Use Tools/Options/Security in Outlook (and Outlook Express) to place them in the Restricted Zone. Now open Internet Options from Control Panel and go to the Security tab. Click on Restricted (it should show High security) and click on Custom. Scroll down and change Scripting/Active Scripting to disable (see screenshot 4). Think of it as a condom for email – not as much fun, but a lot safer.

For general web browsing safety go to Internet Options and raise the security level for all zones to High and disable Active Scripting. Please don't do this on a corporate network without approval. Now you'll find many websites won't function properly. Add those you want to use to the Trusted zone and use Custom to enable its cookies, Active Scripting and Java Scripting as necessary. It's a hassle, but there are monsters out there.

Remove Programs/Startup Disk). Boot to DOS with the Startup Disk. Load without CD-ROM support to save time. From the A:\ prompt, type SYS C: and press Enter to transfer Windows 98 system files from A: to the C: drive. This disables dual-boot; you can no longer boot Windows 2000. Remove the Start-up Disk, reboot to Windows 98. If the Windows 2000 system directory is on a FAT drive, delete it. If it's on a separate partition either use PartitionMagic to change it to a FAT partition or use the Windows 2000 CD as follows. (You must use the Administrator password that you selected when installing Windows 2000.)

Boot from the Windows 2000 CD. If you don't have a bootable CD drive, make the four boot disks by running MAKEBOOT.BAT from the BOOTDISK folder on the Windows 2000 CD. Hit Enter from the Setup Screen to open the next screen which asks if you want to install or repair and then hit F10 to start the Recovery Console. Log on as Administrator. Click on Run and type 'map' (without quotation marks). Make a note of the drive to reformat. Click on Run and type 'format d: /fs:fat' where 'd' is the letter of the drive to format.

Exit from the Recovery Console, reboot into Windows 98 and use Windows Explorer to delete the following files from the root of C:\ -: BOOT.INI, NTBOOTDD.SYS, NTDETECT.COM, and NTLDR. You may have to use View/Folder Options to Show All Files in order to see them. That's it. From here on in we're hard core about Windows 2000. No more talk about deleting it.

CONTACTS

Terence Green welcomes your comments on the Windows 2000 column. Contact him via the *PCW* editorial office or email:
win2000@pcw.co.uk

Entering the games arena

Roger Gann looks at how DirectX 3.0 transforms NT4 from serious OS to gaming platform.

Here's a statement you won't hear too often: 'On many popular 3D games, Windows NT4 is actually a better gaming platform than Windows 9x, offering better performance (no, really) and more stable operation (of course).' How could this be? Isn't Windows 9x the ultimate PC gaming platform and NT4 a 'serious' operating system that has no place in the pursuit of fun? Well, there's a grain of truth in this, but so many gamers have ignored NT4 that it's high time a few myths were dispelled and the story was set straight.

'But,' I hear you say, 'A better gaming platform than Windows 9x? Surely not!' Well, it's undeniable that NT4 is considerably more robust than 9x – you generally have a much better chance of recovering from crashes and misbehaving programs. It's faster, too: an NT4 box that has at least 64MB of RAM and a P6 class processor (ie Pentium Pro, Celeron, Pentium II/III or Xeon) can run up to a third faster than the same system running Windows 9x. This translates into a significantly higher frame rate, the ultimate benchmark of 3D gaming.

If the NT system has a SCSI-based hard disk subsystem, then overall performance increases even more. SCSI subsystems perform much better under NT than Windows 9x. The end result of these two things is that games load faster and are less prone to crashing.

However, in the beginning it was true to say NT4 and games were chalk and cheese. But three things have happened since then to dramatically change that – the release of Service Pack 3 (SP3), the increasing use of OpenGL and growing developer support.

If strategy and role-playing games are your bag, then many of them, including Diablo, should run flawlessly under Windows NT

DirectX and NT

The introduction of SP3 in 1997 made gaming prospects considerably brighter as support for DirectX 3.0 was introduced. OK, DirectX 3.0 may sound old hat (after all, Windows 95 shipped with DirectX 5.0) but it actually opened the door for many games to be played on NT.

So many gamers have ignored Windows NT4 that it's time a few myths were dispelled

To recap, NT4 originally shipped with support for DirectX 2.0 (yawn). However, SP3 added almost complete DirectX 3.0 functionality to NT4, including DirectDraw, DirectSound, DirectInput, DirectPlay and software emulation for the Direct3D 3.0 API. This feature set has remained largely unchanged through subsequent Service Packs, though SP4 included DirectPlay 6 (for network/modem play), which was upgraded to DirectPlay 6.1a in SP6.

The inclusion of DirectX 3.0 in NT4 SP3 was a bit of a surprise. It opened the door for NT users to play some of the older gaming and multimedia titles that were previously unavailable, including most DirectDraw-based titles. In fact, most DirectDraw-based (or 2D) games run well under NT.

The main problem with DirectX under NT4 is the lack of Direct3D support. Most of the latest 3D-based gaming titles require the Direct3D support included in DirectX 5.0 and above. One other thing to note is that the current implementation of DirectSound under NT is purely software-based, so it doesn't directly support advanced 3D audio hardware, such as A3D and Creative Lab's EAX, unfortunately.

However, there is a way to bestow a 'kind of' DirectX 5.0 functionality to your NT4 box. Some clever clogs has posted an interesting file patch on the Internet which adds some DirectX 5.0 DLLs (probably pulled from an early NT5 beta) to your System32 directory, replacing some of the DirectX 3.0-based DLLs. Please note that this is NOT the same as installing the normal DirectX 5.0 or later distribution files. Needless to say, this dodgy stunt is not recommended or supported by Microsoft, *quelle surprise*! The file you need is NT4DX5.ZIP and can be downloaded from several sites on the Internet – I got the 2MB download at ftp://ftp.ixea.net/pub/dos-win/nt40/nt4dx5.zip.

So, what exactly does this hack give you? Direct3D is now available under NT, but sadly without hardware acceleration. However, even without the hardware acceleration, it's now possible to install and run more games under NT4, including Tomb Raider II and Jedi Knight. These are quite playable in software mode, depending on your

hardware configuration. However, some games are very picky and look for specific DLL versions before running.

OpenGL

Gaming under NT also benefited from schanges to NT4's graphics subsystem. With the release of NT4, Microsoft controversially moved the GDI into the kernel (aka Ring 0), thereby greatly increasing graphics performance, although at the risk of possibly compromising the stability of NT4. However, this proved to be a storm in a tea cup.

More importantly, a faster implementation of the OpenGL specification was added. Not only was it faster, but the introduction of the Mini Client Driver model made it easier for graphics card vendors to implement drivers for high-end 3D graphics accelerators, which, in turn, aided the cause of Intel-based platforms as viable, low-cost graphics workstations. It also meant that games which were based on OpenGL were now able to run under NT4.

Microsoft included the OpenGL API with NT4. This was a great idea, since a majority of existing tools were using the OpenGL specification. OpenGL, originally developed by Silicon Graphics (SGI) for its graphics workstations, lets applications create high-quality colour images, independent of windowing systems, operating systems and hardware.

Credit has to be given to two crucial software developers for promoting NT4 as a gaming platform, 3dfx and id Software. The latter's influence dates back to the enormously popular 3D shoot 'em ups Wolfenstein, Doom and Doom II. Quake, id Software's next title, changed the software scene with its breathtaking, state-of-the-art graphics engine. After its release, id went one step further by adding experimental OpenGL support, and this opened everyone's eyes to a brand new gaming experience.

Games that incorporate 3D engines such those found in Quake III and Unreal are among the many that can be played on NT4 with the help of DirectX 3.0

The bottom line back then was 'OpenGL game + Voodoo = ultimate gaming experience'

Coincidentally, 3dfx had released the Voodoo graphics chipset, which was found in the Diamond Monster 3D and Orchid's Righteous 3D. A major feature of the Voodoo graphics chipset was its GLIDE API, which made it easier for developers to take full advantage of the powerful hardware with minimal fuss. And, of course, GLIDE works under NT.

Anyway, the bottom line back then was 'OpenGL game + Voodoo = ultimate gaming experience', an equation that is still fairly valid today.

Getting it together

So, what do you need? Not very much really. The latest Service Pack will provide you with basic DirectX 3.0 support, among other bug fixes, as well as allowing for the installation of the latest 3D accelerators. You'll need a decent OpenGL-compliant video card, preferably based on the 3dfx Voodoo, Voodoo2, or Banshee chipset, as these are probably the best cards for gaming under NT4. In addition to OpenGL support via an MCD MiniGL driver, you also get GLIDE support which allows you to play a wider variety of games.

It goes without saying that you should download the latest video drivers for your graphics card. You'll also want to make sure you download reference drivers from 3dfx's website at www.3dfx.com.

Finally, of course, you'll need some games. If you're a big fan of any game that uses the Quake, Quake II or Unreal 3D engines, then you're in luck, as you'll have a wide selection of games to choose from. Also, if you're into DirectX 3.0-compatible, real-time strategy games, then NT will also work with many titles.

I can't vouch for all of these games, but the following titles are alleged to run flawlessly under NT4: Quake II, StarCraft, Delta Force, FreeSpace 1 and 2, HalfLife, HomeWorld, WarCraft II Battle.net Edition, Diablo/Diablo 2, Age of Empires 1 and 2, Unreal and Unreal Tournament.

However, the biggest problem would seem to be that, because NT isn't considered a 'gaming platform', device drivers for it aren't necessarily DirectX compatible, which will definitely be a game show-stopper. But give it a whirl.

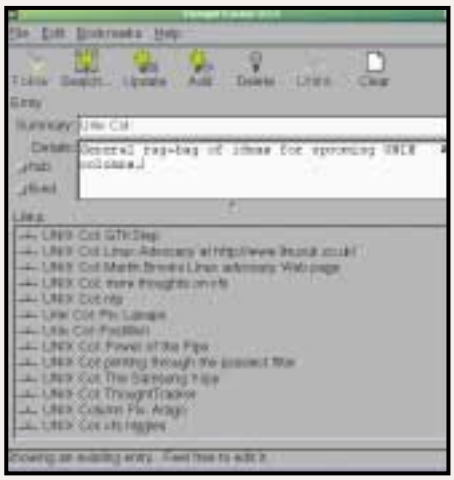
CONTACTS

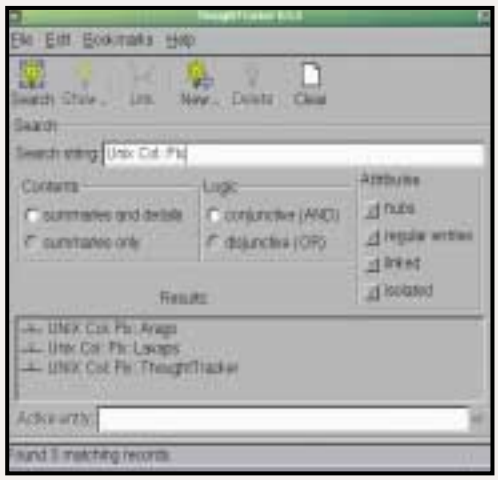
Roger Gann welcomes your comments on the Windows NT column. Contact him via the *PCW* editorial office or email **nt@pcw.co.uk**

Always-on for all

Not satisfied with an ADSL link from his ISP to his workstation, Chris Bidmead goes one better.

Last month I promised to tell you about stage two of the roll-out of my always-on ADSL connection: the process of connecting the whole network, rather than just a single workstation, to the HomeChoice Internet service. When I say 'whole network', I'm talking about a handful of mostly oldish machines, two of which are servers. Internet-wise, one server collects my mail and the other synchronises with a number of time servers and then feeds that time to the workstations.





Left: ThoughtTracker is a simple notekeeper with some smart features. This is the entry display/edit screen. The Unix Col: entry shown here is defined as a 'hub'; in the 'Links' box below is a list of all the entries linked to it. The data is stored in a GDBM (GNU database manager) file, so it's nicely robust and can be accessed by other standard GNU tools
Right: ThoughtTracker lets you search through the database for any particular string using simple Boolean logic. If you're careful about how you set up your links, the combination can be very powerful

From your email I know that many of you who have been into IT for a few years now have accumulated at least a couple of machines. So I hope there's something of general interest in the idea of routing an ISP service. I should probably mention at this point that at least one ISP (in the US) has objected strongly to customers routing a service that, it says, is intended only for a single machine (see below). I can understand why the newly conglomerated Time Warner/AOL/EMI monster (the ISP in this case) might be interested in squeezing every last cent from its customers, but I can't see any technical grounds for charging more for the same bandwidth, however the customer cares to share it. But let's not get into that now.

At least one ISP has objected to customers routing a service intended for a single machine

My router could have been one of the existing machines on the network. But it seemed to me sound practice to set aside a dedicated piece of hardware for this new departure, particularly as, in this case, the hardware was an old 486 machine accumulating dust. The Apricot Xen II made its first appearance in this column in the summer of 1994 (just a couple of months after our first discussion of Linux), but dropped out about three years later because the BIOS wouldn't support large drives and the Linux driver (apricot.o) for the built-in Ethernet connection stopped working with later versions of the Linux kernel.

The router software I used originates from the Linux Router Project (LRP) at www.linuxrouter.org. LRP is a Linux micro-distro, small enough to fit onto a single floppy. Like Tom's Root and Boot (www.toms.net), another micro-distro that regularly stars in this column, it sets up its modest file system wholly in RAM, which allowed me to remove the hard disk from the machine for silent, cool and economical running. By the way, there's a comparable FreeBSD project at http://people.FreeBSD.org/~picobsd.

The LRP implementation offers a ton of options, but all I needed was an Ethernet connection to my LAN, a PPP-style serial connection to the HomeChoice set-top box (along the lines we explored last month) and a kernel to route between them. I couldn't find anything ready-made for this rather unusual requirement (PPP to ADSL is unique to HomeChoice as far as I can make out), but a semi-commercial spin-off from the LRP, called Coyote Linux, took me a good step along the way. (See www.coyotelinux.com and follow the 'what's new' link from there to pick up the story of the ISP objecting to routers.)

Coyote Linux is a ready-made Linux-based system, designed to route between a couple of Ethernet cards. All I had to do was understand its basic mechanics (without, happily having to get into the intricacies of IP masquerating and such stuff, all of which has been pre-packaged by the LRP and Coyote) and then figure out how to take out the Internet-facing Ethernet connection and substitute exactly the same PPP connection as was already working on my ADSL-connected Linux workstation.

The free, open-source and

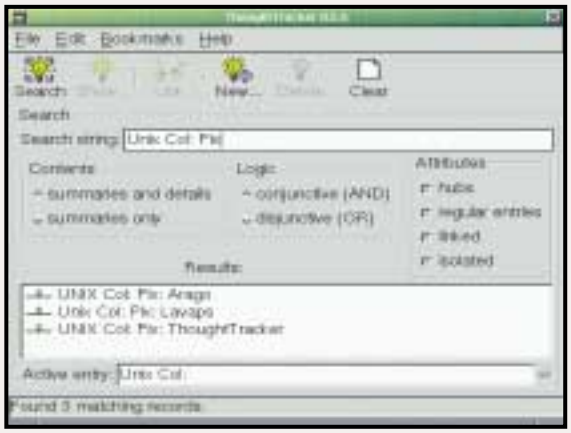
unsupported version of Coyote comes as a downloadable 2.3MB package called coyote-1.13.tar.gz. The double suffix indicates that it needs to be unzipped and then untarred, something GNU tar lets you do in one movement by running:

```
tar xvzf <filename>
```

In practice, I always run tar tvzf on the file first, 't' being the switch that tells tar to list the contents without actually expanding them. Polite tarballs (tar.gz packages) will tidily untar into their own directory below the one you're operating in, but some day sooner or later you're going to come across one that pukes its entire contents into your working directory and the mess will take some time to clean up. (In fact, a pipeline along the lines of:

```
tar tzf impolite.↙
tar.gz | xargs rm -r
```

(*Key: ↙ code string continues*) will automate the clean-up rather nicely).



The shots on the previous page show ThoughtTracker running with Ullrich Hafner's GTKStep library from http://ulli.linuxave.net/gtkstep, which adds a NeXTStep-ish look and feel to the typical plain Gnome/GTK+ look shown here. You can add GTKStep to your Linux system without recompilation; it just needs some mods to a couple of config files as described in the accompanying README

The effect of GTKStep can be dramatic, as shown by the above 'before and after' screenshots of the Gimp toolbox and filehandler. Notice how sliders are reorganised and moved over to the left-hand side, which (as any NeXTStepper will tell you) is where nature intended them to be

The Coyote tarball creates its own directory called ../coyote, at the top level of which is a shell script called makefloppy.sh. I ran this as root and answered some questions about the Ethernet hardware on my target device (the Apricot) and the IP addresses I would need. I'd stuck a 3Com Etherlink III card into the Apricot to compensate for the Linux-inaccessible built-in Ethernet port, so I told the truth about that one and lied about the second Ethernet card that the script assumed I must have. The script took me through some other irrelevant stuff about Virtual Private Networks and then asked me to insert a floppy, whereupon it wrote out a disk image.

The idea is to boot the target machine with the newly hatched floppy and bring up a fully working and configured router. But I knew the image I'd created needed further work and the first job was to inspect it and see what it was made up of. You don't need to boot the disk in the target machine to do this – a good way of speeding up the detailed inspection of a floppy is to copy the disk image back onto the hard drive and then mount it as a loop device.

```
dd if=/dev/fd0 ↙
of=coyote.image
```

does the copying, then it's probably a good idea to run:

One advantage of Syslinux is you can create and modify the disk from non-Linux systems

```
file coyote.image
```

on the image to see what kind of filesystem is being used. In this case I got the result:

```
coyote.image: x86 boot ↙
sector, system SYSLINUX, ↙
FAT (12 bit)
```

so I knew I was dealing with a DOS-style boot image, using the Syslinux boot system (see www.kernel.org/pub/linux/utils/boot/syslinux). One advantage of Syslinux is that you can create and modify the disk from non-Linux systems running DOS, and in fact the commercial version of Coyote comes as a setup script that runs under Windows and creates your floppy from a wizard.

To mount the disk image under Linux as a filesystem-within-a-filesystem using the loop device you run a command line such as this:

```
mount -o loop -t msdos ↙
coyote.image mp
```

having first remembered to create the empty directory, here arbitrarily called mp, as a mount point. Now, when you descend into the mp directory you'll be looking inside the disk image just as you would if you'd mounted the floppy, except that all operations will proceed at hard disk speed rather than floppy speed.

FIG 1 **Floppy disk directory**

-rwxr-xr-x	1 root	root	564	May	2	12:13	config.lrp
-rwxr-xr-x	1 root	root	23062	May	2	12:13	etc.lrp
-r-xr-xr-x	1 root	root	5860	May	2	12:13	ldlinux.sys
-rwxr-xr-x	1 root	root	425825	May	2	12:13	linux
-rwxr-xr-x	1 root	root	502	May	2	12:13	local.lrp
-rwxr-xr-x	1 root	root	639	May	2	12:13	log.lrp
-rwxr-xr-x	1 root	root	36604	May	2	12:13	modules.lrp
-rwxr-xr-x	1 root	root	695115	May	2	12:13	root.lrp
-rwxr-xr-x	1 root	root	191	May	2	12:13	syslinux.cfg
-rwxr-xr-x	1 root	root	44	May	2	12:13	syslinux.dpy

The floppy disk directory looks like figure 1, above.

The lpr files (confusingly known as lpr modules) turn out really to be tarballs in disguise. When expanded (which happens as part of the initial Syslinux load at boot time), these create the complete Linux file structure that will be running on the root RAM disk. It's tempting to make changes on the target machine's RAM disk, but of course these will be lost when you reboot. In fact, Coyote does provide a script to save some of these changes back to the floppy, but the safest way to proceed is to make mods to the stuff inside the tarballs. Next month we'll venture inside some of these tarballs and discuss how to make the manual mods necessary for whatever sort of router you want to set up.

Yet more power to the pipe

In the February issue I was rash enough to issue a challenge to readers to come up with the neatest pipeline for showing the newest file in any directory. As I reported in the May column, the response was huge, but amazingly, your ideas on the subject continue to flood into my mailbox.

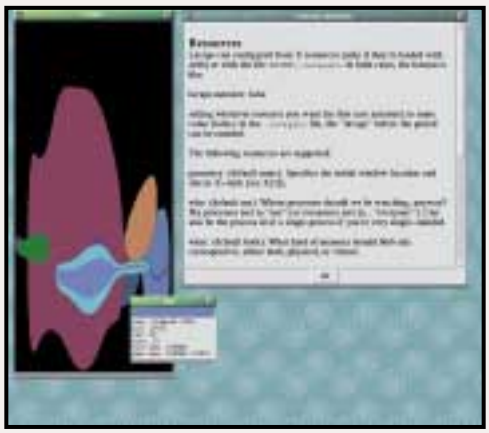
To recap, the idea was to demonstrate the general power of the Unix pipeline with a one-liner that sends the name of the newest regular file to stdout. My starting point was something like:

```
ls -t |  head -1
```

but this will also return a directory (if it's newer than the newest file), or indeed a named pipe, char or block device, or whatever. In order to filter for plain files I went off in the direction of:

```
ls -lt | grep  ^-
```

which of course then presented me with the problem of column-cutting the resulting long file listings. I've learnt a lot about Unix from all your responses and I'm only sorry that there isn't space enough here to explore the many interesting ideas you've come up with. Here's just a very small sample of the ones that caught my eye.



Lavaps is a little Linux utility that looks like screen decoration, but is actually a lot more. The coloured shapes float around inside the resizable window like globules in a lava lamp, representing processes in memory. The size of each blob shows the amount of memory it takes up (the big purple blob is the ld-linux.so shared library), and a right-mouse click gives you info on each process. Search http://freshmeat.org for it

Tarjei Tjùstheim Jensen (tarjei@online.no) suggests:

```
ls -1t | ( while read aa; do ↙
test -f '$aa' && echo $aa && ↙
exit ; done)
```

which makes ingenious use of the bash read command. In a GNU environment, by the way, the -1 flag should be unnecessary, as ls is wise enough always to go into single-column mode when outputting down a pipe.

Another comprehensive solution comes from Peter Gathercole (peter.gathercole@virgin.net):

```
ls -tr | xargs -i find {} ↙
-prune -type f -print ↙
| tail -1
```

Suggestions such as this demonstrated to me that perhaps I was barking up the wrong tree with the long listing mode of ls, but Dave Reeve (dcr1@ukc.ac.uk) goes further, advocating find rather than ls:

'The use of ls in this kind of script can cause problems, because ls looks for an environmental variable that may contain additional switches. Which, of course, may cause a different output and hence upset scripts that rely on keywords (those that use grep), otherwise other version-specific output information will break. Again, this is why there is find.'

Dave suggests that find is inherently fast, and is 'designed to be of much more use in these situations by giving you much greater flexibility'. His own 'pure find' solution goes like this:

```
find ./ -type f ↙
-maxdepth 1 -printf ↙
'%T@ %f\n' | \
sort -r | head -1 | ↙
awk '{print $2}'
```

Sites to watch

I'm a total addict of http://slashdot.org, which keeps me bang up to date on all the latest gossip in the free software community, and also of http://freshmeat.net, a site that tracks all the emerging software from that sector.

While we're on the subject, Martin Brooks (martin@hinterlands.f9.co.uk) writes: 'I just wondered what the possibilities were for getting a gratuitous plug for a site I'm working on mentioned somewhere in the pages of your magazine. www.linuxuk.co.uk is a UK-oriented Linux news and articles site similar to Slashdot.'

Nah, sorry, Martin. I don't do gratuitous plugs... :-)

Martin also has a Linux advocacy site at www.hinterlands.f9.co.uk/runlinux.html which is worth a visit if you're trying to persuade your boss that Linux is a viable alternative to high-priced, hardware-hogging operating systems from, er, elsewhere...

CONTACTS

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GigaHerz fun with a Slot 1

That old friend, the BX chipset, is doing it again for Gordon Laing, with the Slocket that rockets!

What do you get if you cross a Flip Chip Pentium III processor and a sneaky slocket converter? A new lease of life for your old Slot 1 motherboard! That's what I discovered in June's *Hardware* column after realising my ancient Asus P2B Slot 1 motherboard had a future beyond its theoretical ceiling of a 550MHz PIII.

Judging by the number of emails we received on the subject, you were as excited as I was, so this month's column is devoted to getting the most out of your old Slot 1 motherboard! And believe it or not, I've managed to beat the top-scoring 1GHz RDRAM Dell system we tested in June's issue, with the help of an old BX motherboard, some humble SDRAM, a few gadgets, a length of string (no kidding) and a bit of good fortune.

My humble Asus P2B motherboard keeping it real: the Iwill Slocket can handle FC-PGA CPUs and instruct the Asus to supply a lower voltage. Here I've got a PIII overclocked to 1GHz on a 133MHz FSB, with the help of PC133 SDRAM. Note the string used to keep the Slocket from leaning over the overclocked BX chipset in the absence of any Slot 1 retention guides.* Blue Peter *eat your heart out! The Titan fan attached to the chip is now available in the UK from Hills Components: www.hillscomponents.co.uk (01923 424344)

End of the road?

Intel's latest Coppermine process is used in all Pentium III and Celeron CPUs running at or above 650 and 566MHz respectively. It's also used on a handful of PIIIs running as 'slow' as 500MHz, but these are differentiated from older Katmai models running at the same speed, with an E suffix, for enhanced process.

Coppermine runs on a lower core voltage of 1.6v or 1.65v, compared to 2v for the older CPUs. Consequently, your motherboard must be aware of the new process to supply to the lower voltage. I checked the Asus website for information on my P2B motherboard. Unfortunately, I have revision 1.10 and need revision 1.12 to properly handle Coppermine.

Slockets that rocket

As I resigned myself to searching out a new motherboard to handle CPUs any faster than 600MHz, I got hold of a Slocket. These let you use a socketed CPU in a Slot 1 motherboard – they're just a card with a ZIF socket, which has an edge connector to pop into a CPU slot.

It was some time ago that Intel's Celeron shed its slotted cartridge in favour of the Plastic Pin Grid Array (PPGA) Socket 370 design and, ironically, a Slocket lets you pop it straight back into a Slot 1 motherboard. Intel's also gradually moving its Pentium III processors to socketed designs, with today's models available in both Slot 1 and Socket 370 form factors. All socketed PIIIs and new Celeron 2s employ a new Flip Chip Pin Grid Array (FC-PGA) design, which is incompatible with existing 'legacy' PPGA sockets. Instead you need a motherboard with a socket which is aware of both PPGA and newer FC-PGA processors.

I checked the BIOS to monitor the core voltage, expecting it to read a way-too-high 2v

Fortunately, the latest range of Slockets are also aware of both PPGA and FC-PGA CPUs, which allows a Slot 1 motherboard to access any Pentium II, III or Celeron processor, both young and old. There is, of course, that question of core voltage incompatibility with Coppermine, but curiosity got the better of me. I had a pair of Iwill Slocket IIs that sported core voltage adjustment jumpers. I set one to 1.6v, popped in a PIII 600E FC-PGA Coppermine processor, then slotted it into my old Asus P2B motherboard.

Almost unbelievably, the machine started up as normal. I checked the BIOS to monitor the core voltage, expecting it to read a way-too-high 2v, but remarkably, it calmly stated 1.6v. So, despite claiming it wasn't possible, the Slocket was persuading my Coppermine-unfriendly motherboard to be, well, Coppermine-friendly! This may not work on your particular combination of motherboard and CPU and, as always, we cannot accept responsibility for any experiments that go wrong.

Push it harder!

The overclocker is never satisfied, and news of a project on Tom's Hardware website (www.tomshardware.com) had got me thinking. In a test of different chipsets, the website concluded that anyone brave enough to overclock a BX chipset to 133MHz with PC133 SDRAM would enjoy superior performance to newer 820 and 840 chipsets, even when running expensive RDRAM. I decided to investigate further.

The BX chipset was Intel's first to handle a Front-Side Bus (FSB) of 100MHz, which could in turn support PC100 SDRAM memory. With the FSB set to 100MHz, the PCI bus was kept happy at its standard 33MHz, by using a 1/3 multiplier. The AGP bus was maintained at 66MHz using a 2/3 multiplier.

However, many Taiwanese BX motherboards arrived with settings that offered FSBs up to 133MHz, or even higher still. Not long afterwards, SDRAM rated at 133MHz turned up, which begged the question: what would happen if you fitted PC133 memory and overclocked the BX chipset to 133MHz?

Remarkably, the BX chipset itself appears to be a resilient fellow, happy to run at 33 per cent faster than it was designed to. Paranoid, or careful overclockers may, however, wish to remove the heatsink, apply a thin layer of Heat Transfer Compound, then pop it back on again, complete with a 486 fan screwed on top for extra cooling. The paste and fan (part LX51) are both available from Maplins (www.maplin.co.uk), and this process was described in March's *Hardware* column.

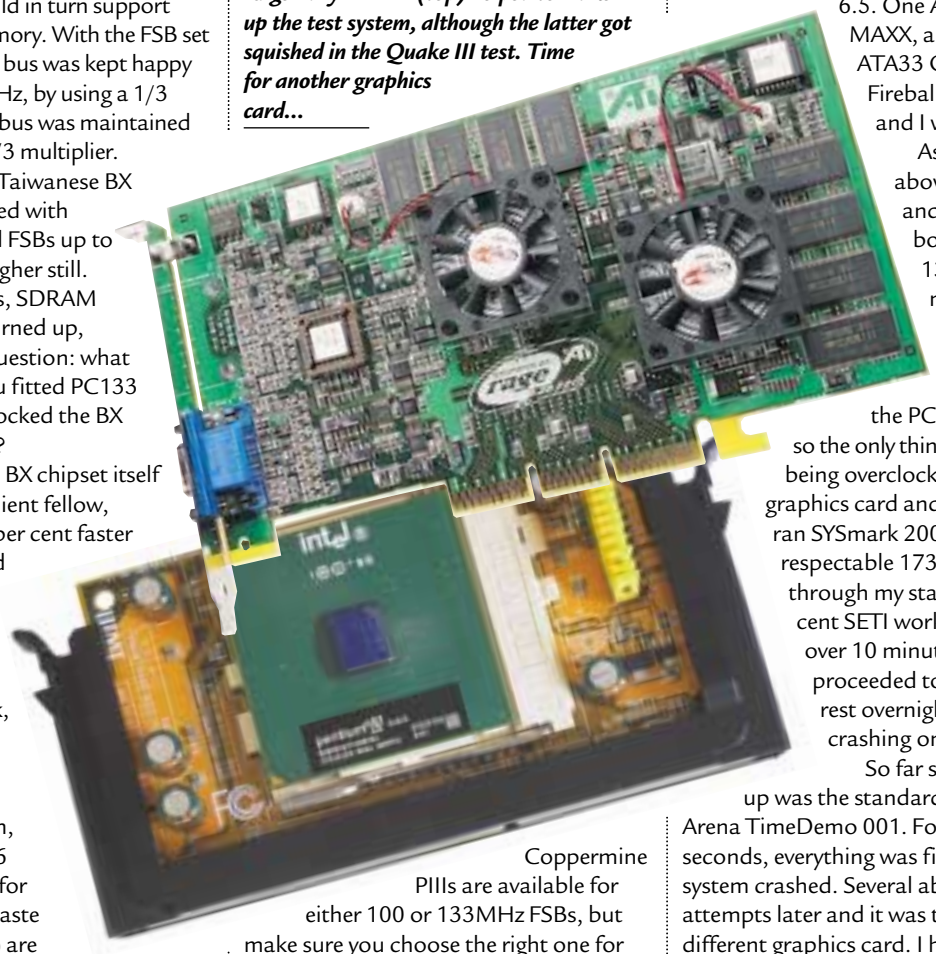
Juicing up the CPU speed

The CPU speed is derived by multiplying the FSB by a number Intel fixes on its retail chips. In other words, a 500MHz PIII, designed for a 100MHz FSB, has a fixed clock multiplier of five times. If you increase the FSB to 133MHz, you'll be driving this chip at five times 133, resulting in a speed of 666MHz.

Overclockers use this trick to squeeze extra juice out of their CPUs, but remember the limits of Intel's processes: if it's a Coppermine CPU, then 666MHz shouldn't be a problem, but older Katmai chips almost certainly won't want to run above 600MHz.

Then again, if you're not into overclocking your CPU but still want to try the 133MHz BX trick, then consider getting a CPU designed for a 133MHz FSB in the first place. Note that many Coppermine PIIIs are available for either 100 or 133MHz FSBs, but make sure you choose the right one for your system – an 800MHz chip could be eight times 100, or six times 133, so if you buy the latter, but install it on a 100MHz FSB, it'll only run at 600MHz.

An Iwill Slocket II (bottom) and ATi's Rage Fury MAXX (top) helped to make up the test system, although the latter got squished in the Quake III test. Time for another graphics card...



Trouble with buses

In my overclocking experience, the real troublemakers are the PCI and AGP buses, which can really throw a wobbly if asked to go even a fraction faster than their 33 and 66MHz specifications.

Do check your motherboard manual carefully though, as many allow a 1/4 PCI setting at 133MHz FSB, which keeps everyone happy – except for the AGP bus. Offering a 2/3 setting at best on most BX motherboards, a 133MHz FSB will result in your AGP bus running at 88MHz, 33 per cent faster than it was meant to. Will your graphics card be up to it? I found out.

How far can you go?

Keen to see how far I could push my Asus P2B, it became the heart of my test system. I fitted 128MB of PC133 SDRAM and an 866MHz FC-PGA PIII via my Iwill Slocket II; the 866 is designed for a 133MHz FSB, so I set my motherboard multiplier to 6.5. One ATi Rage Fury MAXX, and a 13.6GB ATA33 Quantum Fireball Plus KX later, and I was ready.

As explained above, the memory and CPU were both expecting 133MHz, so neither were bothered by the FSB setting. I'd set the PCI divider to 1/4, so the only things that were being overclocked were the graphics card and the chipset. I ran SYSmark 2000 and scored a respectable 173. It also ate through my standard one per cent SETI work unit in just over 10 minutes and proceeded to process the rest overnight without crashing once.

So far so good. Next up was the standard Quake III: Arena TimeDemo 001. For a few seconds, everything was fine, then the system crashed. Several aborted attempts later and it was time to try a different graphics card. I had better luck with a bog-standard GeForce 256 with plain SDR memory from Abit, which repeatedly ran Quake without complaint – for the record, it scored 70.1fps at the standard *PCW* settings of 1,024 x 768 in 16bit mode with maximum detail and no sound. Which graphics cards can handle 88MHz AGP seems to be trial and error.

More!

With this degree of success, it would seem rude not to try a little harder. Intel supplies PC magazines with CPUs bereft of fixed clock multipliers, which

Windows 98 SYSmark 2000 scores

can be handy for exhaustive testing. I increased the multiplier to seven, 7.5 and even eight times, resulting in speeds of 933, 1,000 and 1,066MHz, although to be honest, it wasn't particularly happy at the Battle of Hastings setting.

1GHz seemed fine though, with the SETI unit arriving 35 seconds quicker than at 866MHz, but an identical Quake score of 70.1fps, clearly limited by the card. Most impressive of all was a SYSmark 2000 score of 187. Impressive, since the first 1GHz Intel PC we tested (*PCW* June, *Reviews* p75) was from Dell with an 820 chipset and expensive PC700 RDRAM, yet it 'only' scored 184. So my result wasn't bad from a system using cheap PC133 SDRAM and a motherboard which claims it can't even handle Coppermine CPUs!

Less!

While undeniably happy with my new system, I was curious to see what difference the 133MHz FSB had made to the memory performance. The unlocked CPU gave me a perfect chance to benchmark the system at 800MHz, first using an eight-times 100MHz setting, then trying a six-times 133MHz setting. The only component that changed in this test was the FSB, which affected just the AGP bus and the SDRAM.

The SETI work unit is entirely dependent on the CPU speed, so both settings scored the same, fractionally lower result than the 866MHz configuration. As we've often said, 3D games performance is limited by the graphics card, with Quake again scoring 70.1fps at both FSBs. Had I used a faster card, I would have expected to see some benefit at 133MHz over 100MHz, but for this test, the SDR GeForce was the limiting factor.

After the euphoric result at 1GHz, the SYSmark 2000 score was slightly disappointing: 162 at 100MHz and 165 at 133MHz. Both highly respectable for an 800MHz system, but I was hoping for a greater difference.

Thinking that the memory wasn't being pushed hard enough by SYSmark, I knocked up a quick set of actions in Adobe Photoshop 5.5 which took a 30MB TIFF and performed various filters, rotations and mode changes. I ensured that the processes consumed all available system RAM, but never stepped into the realms of disk-based virtual memory. Rather infuriatingly, the tests took 128 and 124 seconds at the 100 and 133MHz settings, respectively.

Down memory lane

In choosing the cheapest PC133 SDRAM I could find, I'd missed out on the opportunity of using quicker CAS2 memory with lower latency. Memory prices fluctuate regularly, but to give you an indicator inclusive of VAT, in mid-May 128MB of PC100 SDRAM cost £80 or £95 for CAS2. 128MB of PC133 SDRAM came in at £90 or £105 for CAS2. The differences for 256MB DIMMs are higher, with PC100 costing £195 or £220 for CAS2, and PC133 costing £195 or £260 for CAS2.

I would always go for PC133 to give you the greatest flexibility, but real speed freaks may wish to try the CAS2 flavour for the ultimate performance boost.

To be honest, it wasn't particularly happy at the Battle of Hastings setting

You're still not going to see anywhere near a 33 per cent increase over 100MHz though. We're doing our tests with better quality memory, but as a taster, Tom's Hardware ran SYSmark 2000 on a 600MHz BX system with 100, 133 and even 150MHz FSB settings, and got scores of 131, 137 and 141 respectively – not a massive difference, but perhaps justifiable to a dedicated overclocker.

So, with possible AGP incompatibilities, overclocking your BX to 133MHz just for fractionally better day-to-day memory performance may not be worth it, unless it lets you use a 133-FSB CPU, or successfully overclocks a 100-FSB CPU in the process. However, it's worth remembering those high BX/SDRAM SYSmark scores, which, even at 100MHz, are often higher than 820/RDRAM combinations.

Today, a number of new motherboards are available that are based around the BX chipset, but happily recognise Coppermine FC-PGA CPUs without the need for messing around with Slockets, such as Gigabyte's GA-6BX7+. If you are in the market for a Slocket, however, your nearest PC fair could be the best bet – see www.theshowguide.co.uk for listings, but remember to buy one which can recognise FC-PGA and preferably has manual Vcore jumper settings. Dabs Direct (www.dabs.com) normally has an Asus S370-133 model for around £15. There's also an excellent site listing a number of Slockets at (www.chu.cam.ac.uk/~RGA24/slocket/index.html).

CONTACTS

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hardware@pcw.co.uk

Cleaning up the litter

Tim Nott takes you behind the scenes in Word and has suggestions on getting chemical symbols.

Many readers seem bemused by the litter that seems to accumulate in their Word document (and other) folders, so here's a whistlestop guide to what's what.

When Word is started, it immediately creates two temporary files in the Windows TEMP folder – more are added with additional documents – the Visual Basic environment and the Office 2000 multi-clipboard.

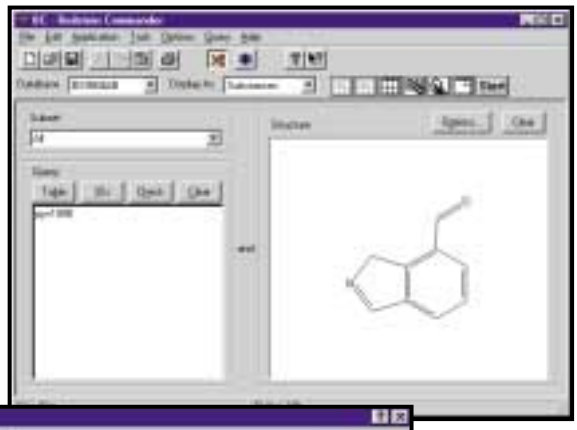
When you open a document another small file is created to show who is editing it; restricting others on a network to read-only access. This file's name starts with the characters ~$, plus the rest of the document name, and is created in the same folder as the document: a similar file is created for the template. Files with the .wbk extension are backups created each time you save a document: see the option in Tools, Options, Save. With Word 2000 this has the friendlier name of 'Back up of (filename).wbk'.

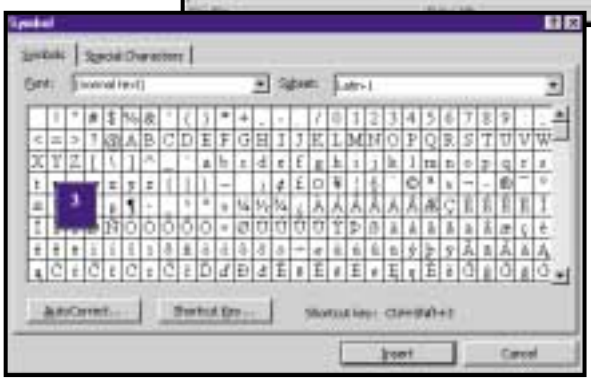
If you have Autorecovery enabled – and you should – then further files are created: again Word 2000 calls these 'Autorecovery save of (filename).wbk'. Default location is in Windows\Application Data\Microsoft\Word, but this can – and should – be user-defined from Word's Tools, Options, File locations.

It also creates a number of other files of the form ~WR*.tmp. Despite the extension, these are copies of Word documents and can be opened as such.

All these files (except for the 'Back up of...') are deleted when Word is exited normally, but will be left behind if the PC suffers a crash or power failure.

We'll look at Autorecovery in a future column, but unless you have lost data, you can safely delete any of these files that have survived a reboot.





Top: Drawing for chemists – Beilstein Commander
Above: Shortcuts to square and cubic quantities

Chemical brothers

In June's *Question Time* we mentioned two home-grown methods of drawing chemical symbols in documents: by using either ASCII symbols or the drawing tools. However, it seems a lot of chemists read this column; Stephan Bird and Frank Hollis both wrote in with details of applications specifically aimed at this task. ChemDraw (www.chemdraw.com) comes in several varieties and can handle anything from SMIRKS to stereocentres: the standard edition costs around £125. Isis Draw, on the other hand, is free for academic and personal home use and you can find it at www.mdli.com.

Matt Griffiths mentioned Beilstein Commander, a chemical database querying package that includes drawing software, which is again available free (www.mimas.ac.uk/crossfire/download .html) and ChemWindow (www.softshell.com), which is not free but does all sorts of drawing tasks including laboratory glassware and 3D molecular modelling.

Moving from molecules to metres, people engaged in producing documents for the building industry – surveyors, architects, contractors and such – frequently have to express quantities in terms of square or cubic metres.

Although one can use the cumbersome sq.m. and cu.m., the accepted abbreviations are m^2 and m^3, with the number being superscripted in each case, and with no space between the quantity and the unit. This isn't particularly difficult to do, but can get tedious if you have to do it many times. It came up in a recent discussion that someone had been using Word's Autocorrect to turn m2 and m3 into the correct forms. This worked well until she upgraded to Word 2000. And then it would only work if a space was left before the 'm'. Such is progress.

There is a simple method. Both the superscripted 2 and 3 exist as ANSI characters in their own right, and can be inserted in any text-producing application by keying in Alt & 0178 and Alt & 0179 respectively (using the numbers on the numeric keypad, not the number keys on the top row of the main keyboard). Nearly all fonts contain these characters, (although, paradoxically enough, not the Architecture typeface that ships with Corel Draw) and any word processor should allow you to assign a 'hot key' combination to them – in Word you can do this from the Insert, Symbol dialog.

CONTACTS

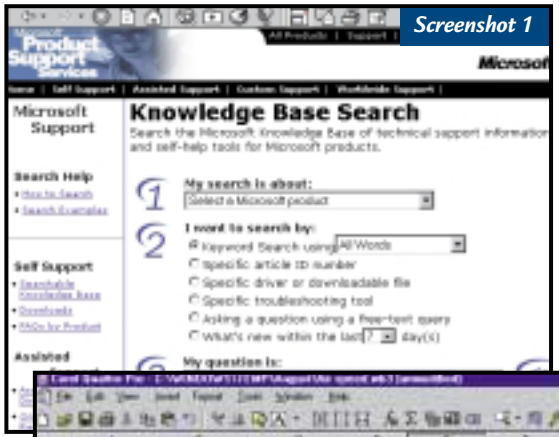
Tim Nott welcomes your comments on the Word Processing column. Contact him via the *PCW* editorial office or email: **wp@pcw.co.uk**. Please do not send unsolicited file attachments

Change the sheets

Alphabetical macros for Excel and calculating air speeds are on Stephen Wells' mind this month.

Andrew Cole wrote in to say that he has lists of materials entered in an Excel 97 workbook. Each worksheet is for a different supplier and these are added at random. He wants to reorganise the workbook and wonders if there is any way of sorting worksheets alphabetically.

There is no built-in method, but it's easy to create a macro to do the job. Open your workbook, then Alt & F11 will open the VBA for Excel editor. Double-click on Sheet 1. If there is already a macro listed there in the right-hand box you can still add another one after it. Either way, carefully type the macro shown in figure 1. Press Alt & Q to return to your workbook. Press Alt & F8 to open the Macro dialog box. Click on Options and you can assign a keyboard shortcut which will run your new macro, say Ctrl & Shift & S (for Sort). That's all there is to it.



Left: It's easy to find and quiz the online Microsoft Knowledge Base
Below: Calculating actual air speed of a journey given the distance, journey times and relative headwind or tailwind

FIG 1

Macro to sort Excel worksheets into alphabetical order by tab name

```
Sub AlphaSheets()
Dim A As Integer
Dim B As Integer
Dim FirstWSToSort As Integer
Dim LastWSToSort As Integer
Dim SortDescending As Boolean
SortDescending = False
FirstWSToSort = 1
LastWSToSort = Worksheets.Count
For B = FirstWSToSort To LastWSToSort
For A = B To LastWSToSort
      If SortDescending = True Then
      If  UCase(Worksheets(A).Name) > _
      UCase(Worksheets(B).Name) Then
      Worksheets(A).Move Before:↙
=Worksheets(B)
         End If
      Else
      If UCase(Worksheets(A).Name) < _
      UCase(Worksheets(B).Name) Then
      Worksheets(A).Move Before:↙
=Worksheets(B)
      End If
         End If
Next A
Next B
End Sub
```

(*Key: ↙ code string continues*)

Look it up

I've mentioned the Excel Knowledge Base in previous columns, but Sara Beckenham hasn't been able to find it. To reach the Microsoft Knowledge Base you need to go to http://support.microsoft.com/search/default.asp. You'll see the page shown in screenshot 1. Then, in the My search is about: box, pick your version of Excel.

I would also recommend that you open Excel, go to Help on the main menu and choose 'Microsoft on the Web', then Frequently Asked Questions. Once connected, this will offer to download a new Help file for your version of Excel that includes many current explanations and links.

Flying high

Tony Sprung emailed with a rather intriguing problem. He's a student pilot and, using Corel Quattro Pro, he wants to know how to calculate air speed allowing for a headwind or tailwind.

Screenshot 2 shows an example. Say the distance of your destination is 345 miles as entered in cell A2. Your outward journey time is 2.75 hours, in B2. The return journey takes 3.25 hours, in C2. The plane speed at this point is 1, in D2, and the relative wind speeds are 1, outward, in E2, and -1.75 (a minus meaning a headwind) in F2.

Enter =D2 in both cells B6 and B7. Enter =E2 and =F2 in C6 and C7 respectively. In B10 enter A2/B2 and in B11, A2/C2. Now choose Tools, Numeric, Invert and in the Source box enter B6..C7. In the Destination box enter E6..F7. Finally, choose Tools, Numeric, Multiply and in the Matrix 1 box enter E6..F7. In Matrix 2, enter B10..B11. In Destination enter F10.

In this example you'll see that, overall, your actual air speed was 118.44mph.

CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. Contact him via the *PCW* editorial office or email **spreadsheets@pcw.co.uk**. Please don't send attached files until requested

Optimise this

It's a smart idea to put some intelligence into your database queries, suggests Mark Whitehorn.

For those who haven't, as yet, had the pleasure of playing with a back-end RDBMS (Relational Database Management System), a query optimiser is a fascinating part of the database engine. It collects a great deal of information about the database – information such as which fields are indexed, how big each table is, how the data is distributed within the tables and so on. Then, when a query comes in, the optimiser looks at it to see if the query can be rewritten to run more efficiently.

'How do they do that?' you may ask. Well, consider a simple example:

PENGUINS		
ID	**Name**	**FishPreference**
1	Peter	Herring
2	Penny	Salmon
...	...	...
34634342	Paul	Halibut

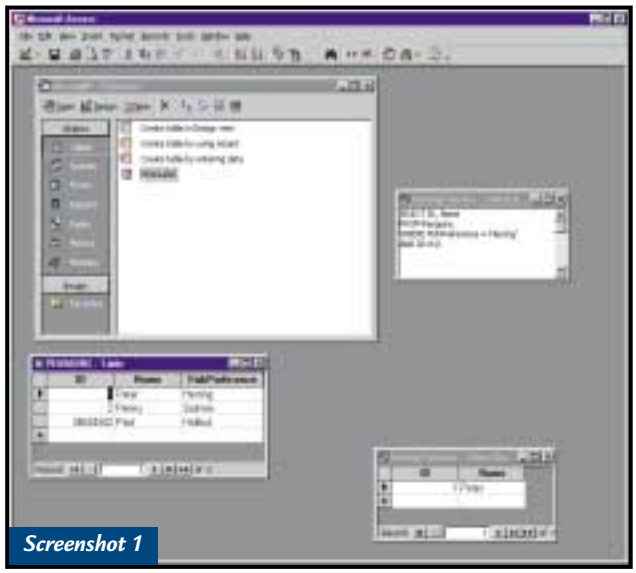
You run a zoo that has over 34 million individually named penguins and their fish preferences are stored in this table in which only the ID field is indexed (see screenshot 1). You run a query such as:

```
SELECT ID, Name
FROM Penguins
WHERE FishPreference = ↙
'Herring'
AND ID<10;
```

(*Key: ↙ code string continues*)

All optimisers will turn such a statement into a series of more basic operations which are then run in sequence. A really dumb optimiser will find all of the records where FishPreference='Herring' and then subset that list to find those records in which the ID field is smaller than 10. A smart optimiser will do those operations in the opposite order. The dumb one has just read all 34 million rows from the table, the smart one, only 10.

This is a really simple example, but consider a database that has a large number of tables. When a complex query that hits many of those tables is entered, the number of possible ways of running the query is huge.



Screenshot 1

Left: For those who want to open a zoo, this file is provided, free of all charges, on our cover disc

So, will a good optimiser examine every possible path, estimate how long each would take to run and then run the fastest? Well, you can probably see the problem with that. Suppose it takes two minutes for the optimiser to do the calculations and that the worst query takes one minute to run and the best two seconds. The time taken to get the answer is two minutes and two seconds, which is worse than the worst possible solution!

So, in practice, a really good optimiser has a difficult balancing act to perform – trying to find a good (but possibly not the best) solution in the shortest possible time. This means that optimisers are among the most difficult parts of an RDBMS to write.

It also means that good optimisers will show you (often graphically) the solution it has found so that you (as an intelligent human) can tweak the result by hand. In addition, such a paragon of virtue will also often suggest ways in which you can restructure the database to improve the result. The most obvious

Raiding the larder

We have looked at two solutions to the 'larder' problem (which we last visited in the May issue) where we want to know what recipes can be made using the ingredients present in our larder at any one time. Paul Phillips (paul@boothfields.demon.co.uk), who is a certified Oracle DBA (Database Administrator), recommends the use of 'not exists' in preference to the 'not in' clause for reasons of efficiency. He says that the replacement of 'not in' with 'not exists' is, in fact, a standard Oracle performance tuning tip. In any of the back-end RDBMSs such as SQL Server, DB2 or Oracle (assuming the obvious keys are indexed) and with a large number of records, this can make a big difference. The same may not be true in Access because the query optimiser may not be smart enough.

Paul's version of the required SQL is:

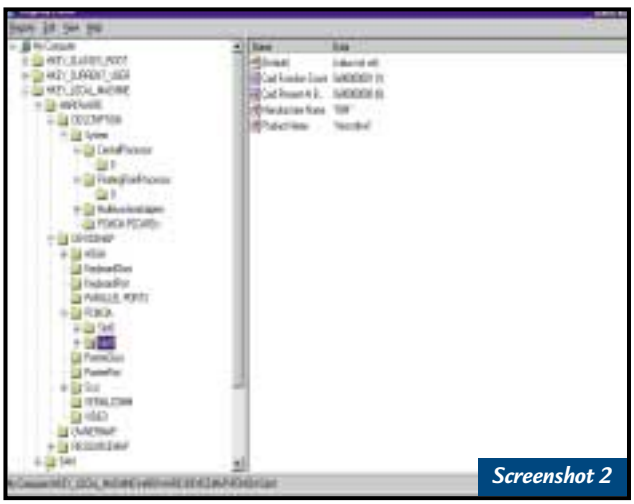
```
SELECT d1.dish
from dishes as d1
where not exists ↙
(select dishid
from [dish/↙
ingredient] as di1
where d1.dishid ↙
= di1.dishid
and not exists ↙
(select ↙
IngredientID
from larder as l1
where ↙
l1.IngredientID ↙
= di1.Ingredient↙
ID))
```

way in which this can be done is to add indexes to certain fields, but it may also, for example, involve splitting data from one table into several.

Optimiser design is difficult, so different companies guard their algorithms jealously. The better the optimiser, the better the database will behave in the all-important speed testing, which is often performed against well documented data, such as that used for the TPC-C (Transaction Processing Performance Council) benchmarks.

It has been suggested that certain products have optimisers which actually recognise such testing data and jump immediately to pre-programmed optimal solutions. This is a wonderful idea and I would love to believe it but, as with most stories of this type, hard evidence never seems to surface. And it would be easy to test the theory. You would run the TPC-C benchmarks and then begin altering facets of the data that shouldn't make a difference to the timings (such as table and field names) to see if the timings suddenly nose-dived. Has anyone ever tried this?

I really cannot imagine why anyone would be sad enough to want to try this out in Access, but I've also found that if I illustrate anything and don't include sample files, I usually get emails asking for them. So, for the benefit of everyone who is intending to run a zoo with 34 million penguins, the sample file is on the cover disc. And by the way, please invite me to the opening of your zoo.



Screenshot 2

Regedit shows a stack of redundant data in the Registry, but is that reflected in a non-normalised structure underneath?

Sounds like Soundex

Back in the June issue we looked the Soundex algorithm, which is used to find words that sound like a search string. I asked for you guys and gals to submit your own attempts at coding Soundex and promised to put the best examples on the cover disc.

Nigel Bachmann (N.Bachmann@cardiff.gov.uk) was kind enough to send in his version written in Access Basic. Ian Hartas (ian.hartas@iclway.co.uk) has experimented with Soundex algorithms for a while and found a problem when they are applied to surnames. His own last name, for example, is a rare English name and he has found several variations, Hartis, Hartus, Hartass and even Artas. In the south, (where 'urricanes 'ardly ever 'appen) with dropped 'H's, the most common variant is Artis.

The standard algorithm, which assumes that the first letter is vital and correct, fails to match some of the variants, so he developed a version in C that doesn't assume an exact first letter match and also attempts to catch 'Mac', 'Mc' and 'O' prefixes. The letter 'W', he decided, also needs similar treatment to 'H'.

I haven't tried either of these, but I am grateful for both and they should come in useful for those of you who want to investigate the problem further. Both are in a text file on the cover disc as SOUNDEX.TXT.

The better the optimiser, the better the database will behave in the speed testing

ISBN lookups

ISBNs (International Standard Book Numbers) are, for obvious reasons, often stored in book catalogues. The different parts of the number encode information concerning the country and publisher.

After much research and typing, Mike Green (100015.222@compuserve.com) has produced some tables that can be used for lookups for country and publisher numbers. He has also written some functions for returning those values. He has been kind enough to offer these to anyone who would find them useful. You'll find them on this month's cover disc in the *Hands On* section.

He also asked about my comments that the Registry should be a 'real' database and wondered what other readers think the structure of such a database would be. He reckons all that is really required is a simple three-column table with probably a sizeable chunk of code.

In fact, my comments were more about imposing transaction control, logging and rollback in the event of a complete disaster. However, it is an interesting thought.

Regedit (screenshot 2) seems to suggest that there is a quantity of redundant information in there. While this tells us nothing about the internal structuring of the data, because Regedit may be using a view (or query in Access-speak) to show us the data, it does suggest that it might be more efficient to store the data in multiple tables. Does anyone have more specific knowledge of the data stored in the Registry and want to volunteer some info?

CONTACTS

Mark Whitehorn welcomes your feedback on the Databases column. Contact him via the *PCW* editorial office, or email:
database@pcw.co.uk

Audio go slow

Check the driver before you jump on the Windows 2000 bus, Niall Magennis warns the PC musos.

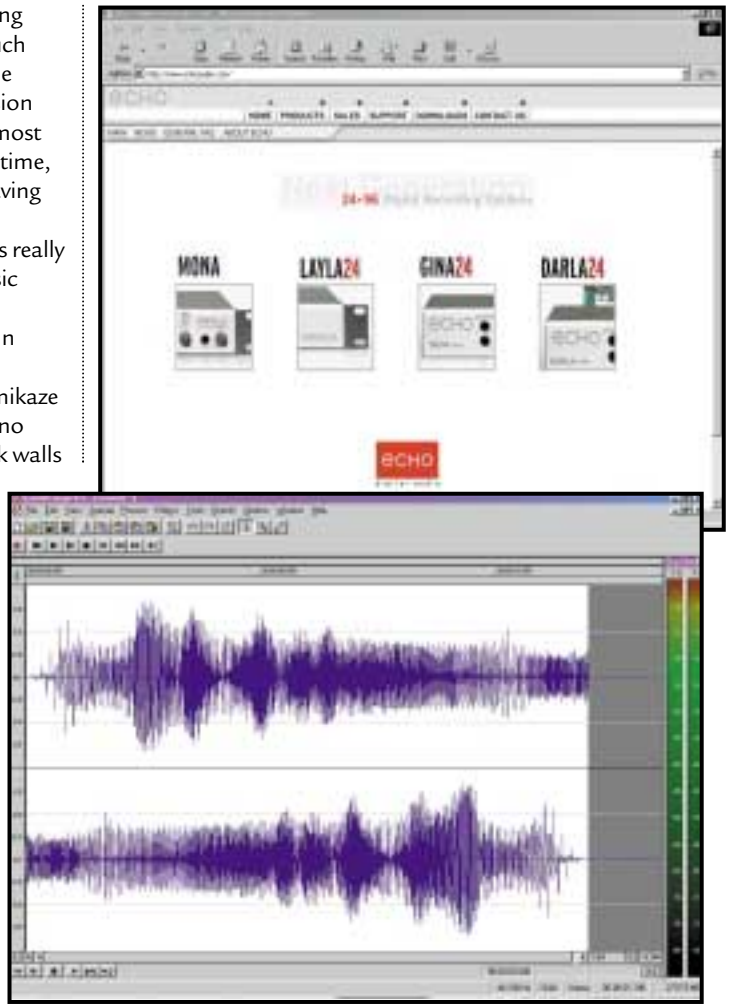
With Be showing about as much interest in the desktop version of BeOS as most drummers I know show in keeping time, and Steinberg and Emagic both having announced that they have ceased developing for the platform, there's really only one serious choice for PC music bods in the near future and that's Windows 2000. But not all is rosy in the Microsoft garden either.

Those of you who share my kamikaze desire to try out all things new will no doubt already be aware of the brick walls you can hit as soon as you try to get your music applications running under Windows 2000.

It's not so much that the software won't work – most will at least install – it's more that once you get past this stage you'll find the software as stable as a one-legged camel.

Most of this is down to the fact that Windows 2000 is, as it says on the loading screen, based on technology developed for Windows NT. As we all know, Windows 9x has been the platform of choice for music software developers and most of this software never worked on NT, so therefore it's not going to work on Windows 2000, either.

Well, I can understand why it doesn't work on Windows 2000, but what I can't understand is why music developers have been so slow to respond to an OS that has been available in beta for around two years and offers such clear benefits to musicians.



Left: Find drivers for Echo products on its website Below: Sound Forge should work with no problems

So what should Windows 2000 mean to musos? Well, the first thing you'll notice about Windows 2000 when you switch from Windows 98 is that it looks almost exactly the same as previous versions of Windows. This is because most of the changes are hidden under the bonnet.

For example, Windows 2000 is much more mature about the way it deals with unruly behaviour from programs that refuse to play by the rules. If you're running a number of applications and one decides to execute the computer equivalent of a late tackle, Windows 2000 is far more likely to catch it in the act, pull out the red card and boot it out of memory, leaving the other players to fight it out for the fair play award.

This, naturally, is music to the ears of those who use their computers for audio, as a moment of unbridled creativity lost to a crash can never be regained.

Most of this software never worked on NT, so it's not going to work on Windows 2000

Driving test

The other major change is a new kind of driver architecture. This means that many peripherals are not currently supported, especially semi-professional sound cards and MIDI interfaces. On top of this, manufacturers are now supposed to put their drivers through the computer equivalent of a driving test. This involves rigorous testing of the driver on a number of different systems to make sure that they behave themselves in the company of other drivers for other cards. Microsoft reckons that this will guard against driver rage, where one driver starts bumping into the territory of another driver.

However, the new driver architecture means that most MIDI drivers won't work properly under Windows 2000. NT4 drivers will probably install and work to an extent, but you are likely to experience timing problems. What you really need is a Windows 2000 driver that supports DirectX 7's DirectMusic

MIDI driver (which may also be called a WDM driver).

This is the only type of driver that will offer satisfactory timing under Windows 2000; unfortunately, at the time of writing, these were pretty scarce on the ground. Steinberg's list of hardware with WDM MIDI drivers only had a single entry – the SoundBlaster 16. I think this may be a bit misleading, as Creative has posted Windows 2000 drivers for its Live! range of cards on its website. I don't have an SB Live! so I can't test whether it includes a WDM MIDI driver. The FAQ on Creative's site seems to indicate that it does, so if you're a SB Live! owner you may be in luck.

I own a Mark of the Unicorn MIDI Flyer Express MIDI interface, so I emailed Motu to check whether the company had a driver available for Windows 2000. It didn't, but the reply did say that the company was working on one, although it couldn't give me a date for when it would arrive. I'm not going to hold my breath, as Motu has only just released an updated driver for the device to fix some problems under Windows 98.

A similar problem exists on the audio side. Although my Ensoniq AudioPCI card is supported under Windows 2000, the card I really want to use – the Echo Darla – is not. Luckily, Echo is a bit more on the ball than Motu and drivers for Windows 2000 should be posted on its website by the time you read this. Windows NT drivers are also now available.

It may be some time before most of these drivers are certified. Microsoft has made a big issue of this new driver certification model, but how effective it will be remains to be seen. It's unlikely that companies are going to pay to put every release of their drivers through the certification programme. This is because only later releases are likely to pass, and by that time the hardware may have been superseded by newer devices on the market.

Audio apps

I've had a rare old time getting audio applications to run under Windows 2000. Some, such as Sound Forge, seem to work fine, but others, including Cubase, don't seem to be completely happy. I've heard of other people running Cubase under 2000 without any problems, so it probably depends heavily on the drivers for your audio and MIDI cards. If you're going to try it, then make sure you have the latest version of Cubase – 3.71 R2 – as that is the only one that Steinberg says will work.

Cubase version 5 is on the way and should have full DirectMusic support

There is a new version of Cubase on the way, version 5, which will have full support for Windows 2000. Steinberg says that this version should have DirectMusic support, but that the company is dependent upon the availability of beta DirectMusic drivers from the major MIDI interface manufacturers to be able to test the work it has done.

I've heard of other people running Cubase under 2000 without any problems

I haven't tried Logic under Windows 2000 yet, but Emagic recommends that you currently stick to Windows 98.

So why was I bothering at all with audio software under Windows 2000? Because I've got a dual-Celeron Abit BP6 motherboard and I don't like the fact that one of my processors is sitting idle under Windows 98.

I had hoped that updated software for Windows 2000 would include multiprocessor support, but now my hopes are starting to fade.

Windows 2000 supports multiple CPUs, but you really need each application to support the extra CPU as well. Applications with multiprocessor support are written so that different processes are split into independent threads of code that can run in parallel on different processors; Windows 2000 just has the task of managing the allocation of threads between the CPUs.

Apparently, this is reasonably easy to do with applications such as word processors and image-editing packages, but realtime applications – such as audio and MIDI sequencers – have to deal with some special problems.

When working with more than one CPU, a realtime application needs to sync together the actions of the CPUs. For example, if you've got two plug-ins running on separate CPUs and being used as insert effects on the same channel, then the output of the first plug-in feeds the second plug-in. In this case, the second CPU would have to wait until the first CPU has finished its job before it can start its processing.

Steinberg is working on optimising Cubase VST for multiprocessor systems, but it says that it will be an ongoing process that will span several releases.

The best advice I can give you at the moment if you're thinking of upgrading to Windows 2000 for music applications is don't. At least not unless you're sure all your MIDI and audio hardware has full WDM driver support.

CONTACTS

Niall Magennis welcomes your comments on the Sound column. Contact him via the *PCW* editorial office or email: **sound@pcw.co.uk**

The A-Z of SVG

A new open standard for putting vector graphics on the web has arrived, reports Ken McMahon.

SVG is a new graphics format for the web. Don't we have enough of those with GIF, JPEG and PNG? Well, the exciting thing about SVG is that it's a vector format, whereas all those others are bitmaps. The advantages of vector graphics over bitmaps are already well understood by those working in print. They're scalable with no loss of quality – edges stay smooth no matter how big you enlarge them and file sizes remain small.

SVG has a number of other important advantages. It's an open standard, developed by a working group of the World Wide Web Consortium (W3C), which includes Adobe, Apple, Corel, IBM, Macromedia, Microsoft, Netscape and Quark. Adobe has included SVG support in the recently released Illustrator 9, Corel has a beta SVG export filter available for Draw and a number of companies, IBM among them, produce viewers and convertor filters. So support for the format is already growing.

SVG is based on XML (Extensible Markup Language). Images are entirely text-based, which means that text remains editable even after transformations and special effects filters have been applied. It can also be searched and indexed. SVG provides support for cascading style sheets and ICC colour profiles.

SVG images provide a much richer more interactive experience than animated GIFs and JPEGs. Adobe's SVG Technology Preview website has a wide selection of images which demonstrate the format's features. Pan and Zoom is shown to good effect using a street map of Moscow (screenshot 1). You can zoom in from a city-wide view to individual building detail. Street names, parks, rivers and other details can be hidden or revealed using check boxes. Vector scalability also enables you to print a high-resolution hard copy at 1:1 scale – if you have a printer big enough.

Animation and filter effects are combined, so you can watch type blur in and out of focus. Transparent text, text with drop shadows or glows, text used as masks, marbled, etched and text set on fire is still text, and can be searched for, found, cut, pasted, even edited.

SVG conforms to the Document Object Model (DOM), so programs and scripts can dynamically access and update the content of SVG graphics. Event handlers, familiar to anyone who has produced Javascript rollovers – onmouseover, onmouseout, onclick etc – can be assigned to any SVG object.

FIG 1

A circle with a red fill and a blue stroke

```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE SVG PUBLIC "-//W3C//DTD SVG December 1999//EN"
 "http://www.w3.org/Graphics/SVG/SVG-19991203.dtd">
<SVG width="12cm" height="4cm">
  <desc>Example circle01 - circle expressed in physical ↙
units</desc>

  <circle cx="6cm" cy="2cm" r="1cm"
       style="fill:red; stroke:blue; stroke-width:0.1cm" />
</SVG>
```

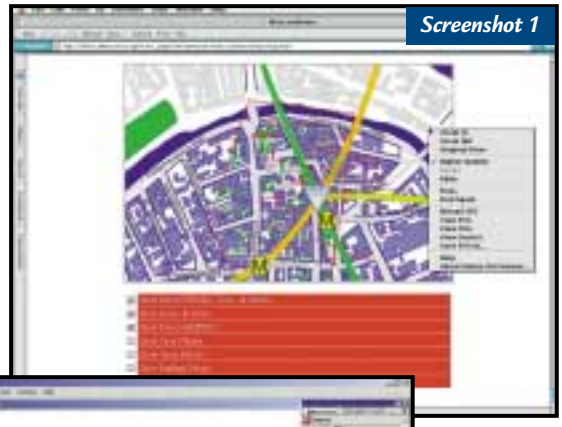
Moving a triangle along a semicircular motion path

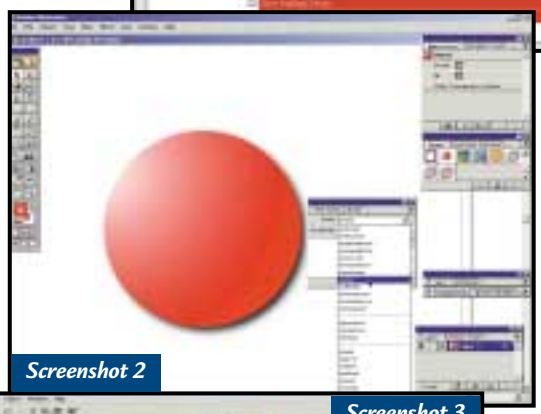
```
<?xml version="1.0" standalone="no"?>
<!DOCTYPE SVG PUBLIC "-//W3C//DTD SVG December 1999//EN"
  "http://www.w3.org/Graphics/SVG/SVG-19991203.dtd">
<SVG width="5cm" height="3cm"  viewBox="0 0 500 300">
  <desc>Example animMotion01 - demonstrate motion ↙
animation computations</desc>

  <!-- Draw the outline of the motion path in blue, along
        with three small circles at the start, middle and ↙
end. -->
  <path d="M100,250 C 100,50 400,50 400,250"
       style="fill:none; stroke:blue; stroke-width:7.06" />
  <circle cx="100" cy="250" r="17.64" style="fill:blue" />
  <circle cx="250" cy="100" r="17.64" style="fill:blue" />
  <circle cx="400" cy="250" r="17.64" style="fill:blue" />

  <!-- Here is a triangle which will be moved about the ↙
motion path.
       It is defined with an upright orientation with the ↙
base of
       the triangle centered horizontally just above the ↙
origin. -->
  <path d="M-25,12.5 L25,12.5 L 0,87.5 z"
       style="fill:yellow; stroke:red; stroke-width:7.06" >

    <!-- Define the motion path animation -->
    <animateMotion dur="6s" repeatCount="indefinite"
                  path="M100,250 C 100,50 400,50 400,250" ↙
rotate="auto" />
  </path>
</SVG>
```

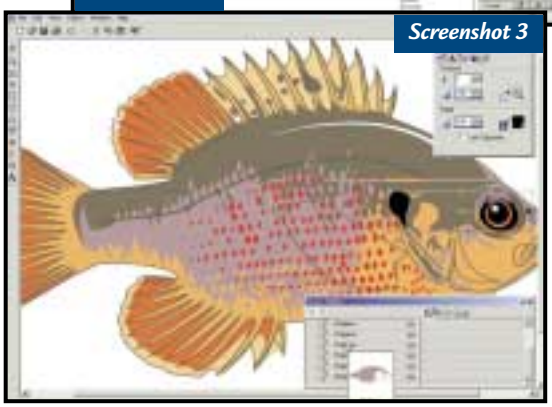
(*Key:* ↙ *code string continues*)

But Macromedia Flash does all of this and has for some time, so why do we need something new? The developers of SVG argue that because it's an open standard, based on XML and integrates with many other industry standards, it's better for developers of web content than a proprietary standard such as Flash.

In its favour, according to figures from researchers IDC, Flash has more than 248 million users (for the latest count go to www.macromedia.com); it is a sophisticated authoring application that is well ahead of anything available on the SVG front; it has a growing army of skilled practitioners and an impressive portfolio of dynamic Flash content for blue-chip companies such as Hoover, Nike and Ford.







Top: Adobe's SVG map demo in IE5 on the Mac
Middle: Illustrator 9's SVG interactivity palette
Bottom: Trajectory Pro's interface

Coding SVG

Figure 1 (opposite) shows what SVG looks like, taken from the W3C SVG 1.0 Specification Working Draft of 3 December 1999.

SVG defines six basic shapes – rectangle, circle, ellipse, line, polyline and polygon. The first example in figure 1 shows a circle with a red fill and blue stroke. As you can see, SVG looks a lot like HTML, with opening and closing tags. The first line establishes that what follows is XML, next the Document Type Definition (DTD) defines element attributes and XML document structure. Everything between the SVG tags is the graphic itself. The circle is displayed in a12 x 4cm image area. cx and cy are the co-ordinates for the centre of the circle which has a 1cm radius, the rest is self-explanatory.

It gets more complicated when you use the advanced features. The second example in figure 1demonstrates some of SVG's animation capabilities by moving a triangle along a semicircular motion path.

What SVG needs soon is an authoring application that will make complex animation effects as simple to create as they currently are with Flash. My guess is that Adobe is the most likely source of such a product, either as components in the next release of Illustrator and GoLive, and/or as a standalone product.

In the meantime, Illustrator 9 provides some SVG-authoring tools. Event handling features can be implemented from its SVG interactivity palette. You select an event from the popup and then either type your JavaScript routine into the window or browse for a JavaScript file to associate with the event (screenshot 2).

An SVG export plug-in provides options for font and raster-image embedding, encoding and CSS properties. A plug-in that SVG-enables your browser is also supplied and all of this can be downloaded from Adobe's website (see contacts box).

You can use the export plug-in with Illustrator 8.01 and the viewer is compatible with Explorer 4.x-5 and Navigator 4.0-4.7 on Windows, and IE 5 and Navigator 4.07-4.7 on MacOS. If you use both browsers you'll need to copy the viewer files (SVG-view.dll and SVGviewer.zip) from the Explorer plug-ins folder to the Navigator one.

Mac users can't view dynamic SVG content using Explorer because communication between plug-ins and JavaScript is currently non-existent in either direction. So if you want to make the most of SVG on your Mac, Netscape Navigator is really the only option.

If you don't have Illustrator and unarmed combat with SVG in a text editor doesn't sound appealing, there are other options. A beta SVG export filter for CorelDraw is available from the Corel website and there are a number of converters that will take vector format files and turn them into SVG.

JASC, well-known for its Paint Shop Pro image-editing software, is ahead of the game. A 'preview' of its Trajectory Pro SVG authoring application can be downloaded for free from the JASC website (see screenshot 3 and contacts box).

CONTACTS

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Here are some SVG links for you to try:

www.w3c.org/graphics/SVG
www.adobe.com/SVG
http://beta1.adobe.com/svgpreview_alpha/SVG/download/download.html
www.mayura.com
www.jasc.com
www.beatware.com
http://sketch.sourceforge.net/
http://venus.corel.com/nasapps/DrawSVGDownload/index.html
www.levien.com/svg/
www.geocities.com/wglunz/pstoedit/
http://sis.cmis.csiro.au/svg/
www.inria.fr/koala/jackaroo
www.SVGcentral.com

Getting in touch

Benjamin Woolley weighs up the potential for Metastream 3's interactive graphics online.

Proclamations of 3D's imminent emergence on the Internet are beginning to repeat like a dodgy vindaloo. Many who swallowed the idea are now discovering some of its less appetising side effects: bandwidth becomes constipated by the surging growth in traffic, systems become stuffed with indigestible plug-ins and bloated demonstration sites cause browser blow-out.

The release of Metastream 3 is another attempt to whet consumers' appetites. But don't be fooled by the understated increment in the version number, it disguises a fundamental revamp for this technology.

Where the listless VRML was designed to be the HTML of 3D, Metacreations' Metastream was to become the Flash or Shockwave. Nothing like that has yet happened. Even active web users making regular visits to online stores are unlikely to have found many Metastream objects, whereas they will undoubtedly have been regularly Flashed or Shocked.

However, the demand for 3D is apparently there. Metastream claims that research by Greenfield Online Research (www.greenfieldonline.com) has found that consumers 'are far more likely to purchase products that are presented in detailed 3D over those displayed as 2D photographs'. Furthermore, 'users are much more likely to visit and remain at an ecommerce site that contains high-quality, 3D product presentations' and are more likely to be satisfied with the products they subsequently buy.

It is difficult to assess how representative these findings are, but surely one major disadvantage of online shopping is that you can't handle the goods, and 3D may go some way to providing a virtual substitute. This is where Metastream 3 shows the greatest promise.

Technically, the most innovative aspect of Metastream 3 is that it uses XML (Extensible Mark-up Language), which is supported by Netscape Navigator and Internet Explorer versions 4 and above. XML turns browsers into an environment for running applications, which in Metastream's case means turning it into a tool for rendering and manipulating 3D objects. A Metastream scene (ie a set of 3D objects, textures and rules for manipulating them) comprises two files, a datafile (carrying the .mts extension), which contains descriptions of the objects and textures to appear in the scene, and an XML file. The latter is a series of plain-text 'tags' which can be stored in a separate file (carrying the .mtx extension) or form part of the web page where the objects are to be displayed.

A basic XML file would read something like this:

```
<?xml version="1.0" ?>

<MTSScene>
<!-- .... Scene Description -->
</MTSScene>
```

The scene description comprises a series of tags setting up parameters for the scene. See the example in figure 1.

The tags are in many cases quite straightforward and will be familiar to

Screenshot 1

Screenshot 2

Left: A mock-up of an online jewellery store shows how smoothly a 3D Metastream 3 model of a ring can be manipulated
Below: By incorporating XML, Metastream 3 turns the browser into a tool for interacting with 3D objects, allowing users to customise the ring with an engraving

FIG 1 **Example of a scene description**

```
<MTSSceneParms AntiAlias="1" DoShadow="1" BlendShadow="0" ↙
ShadowOpacity=".5" ShadowRadius="15">

<MTSObject Name="cylinder" Path="c:/demo" Geom="MTSCylinder" >

<Transform Type="current">
<Scale x="2" y="2" z="2"/>
<Shear xy="0" yz="1" xz="0"/>
<Rotate x="0" y="2" z="0"/>
<Position x="`" y="1" z="0"/>
</Transform>

<MTSMaterial Name="metalcyl" ID="0">
<MTSTextureMap Type="Diffuse" Name="metalcyl.jpg"/>
<MTSColor Name="Diffuse" r="0.2" g="0.2" b="0.2"/>
</MTSMaterial>

</MTSObject>

</MTSSceneParms>
```

(*Key:* ↙ *code string continues*)

anyone who has used scene description languages with renderers such as POVRay. For example, the MTSSceneParms sets the parameters for the entire scene, such as whether anti-aliasing should be implemented (if set to "1", the edges of objects will be smoothed unless the object is moving, in which case anti-aliasing is automatically suspended to speed up the frame rate) and whether shadows should be cast. MTSObject calls up the object data held in the .mts datafile and provides a pathname if required.

However, Metastream 3's use of XML allows for far more sophisticated features than these, notably a series of tags for adding animation and interaction. These are sparsely documented so it's hard to assess how powerful they are, but demos on Metastream's website (www.metastream .com) indicate that some pretty useful effects can be generated.

One example was a mocked-up jewellery store featuring a ring (screenshot 1). When the realistic-looking ring was manipulated using the mouse, it moved very smoothly. But the really exciting bit, possible only using Metastream 3's XML functions, was adding an engraving (screenshot 2).

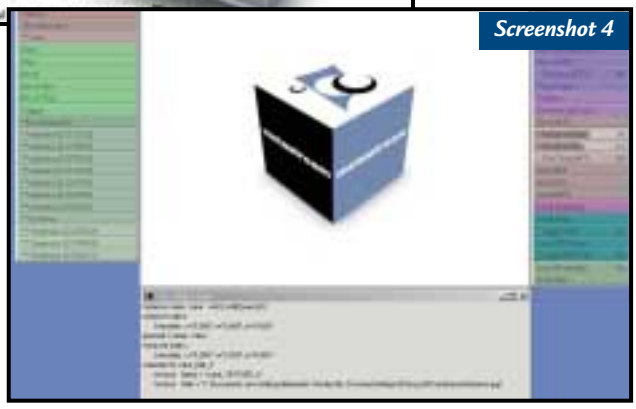
Another demonstration featured a luscious Sony Vaio laptop (screenshot 3). By clicking on the power switch, the LCD can be switched on and off, and by clicking on the lid, it can be made to open and close. Metastream offered this as an example of how version 3 allows the user to 'touch' objects, ie make them respond to mouse actions.

The demo worked well enough to make me think I wanted a Vaio. However, it did reveal some possible limitations of Metastream, in particular the problem of combining 'touch' and other interactions with 'streaming'. The ability to stream objects, that is, display a model at increasing levels of resolution as the data is downloaded, is one of Metastream's most notable features. However, it adds a layer of complication to interactions such as 'touching' which, in the case of the Vaio demo, was apparently resolved by making the object inanimate until it was completely downloaded – which took some time even over an ISDN line.

Despite such issues, Metastream 3 is a clear step forward. Being able to play with a toy at a toy store or climb into a car at an online dealership will surely make choosing that much easier (and buying that much more tempting).

Metastream has claimed that many major companies have agreed to use Metastream on their sites, including AOL, Sony and Nike. However, its chances of becoming a standard depend on more than providing touchy-feely features and boasting blue-chip support. It depends on content and, in particular, on developers and designers having access to decent authoring tools.

Metastream has produced a crude tool to encourage early adopters to try out the technology (screenshot 4), as well as a preliminary XML guide (both downloadable from the website). But until it becomes truly integrated with other 3D authoring products, graphics artists and web developers are unlikely to use it. It is hard to see how this will happen. Exporting objects and animations from a package such as Lightwave, 3D Studio MAX or Metacreations' Carrara should be comparatively straightforward. But scripting for interaction remains an undeveloped area in 3D, and most existing tools are too technical for designers and artists.



Top: Metastream 3 allows you to 'touch' and interact with the 3D images. This Sony Vaio can be opened and turned on with a couple of mouse clicks
Bottom: Metacreation's latest 3D authoring tool sees the company shifting its focus to the Internet

A new spin on 3D

Metastream is 80 per cent owned by Metacreations. As reported in this column in the May issue, Metacreations has decided 3D over the Internet is now its primary focus, and it has been divesting itself of its graphics products.

All have now found hopefully good homes. Poser has returned to its original developer Larry Weinberg, and Bryce has gone to Corel, along with some of Metacreations' 2D graphics products, where it should be safe. Canoma, the product for turning 2D pictures into 3D models, and Carrara, the brand-new 3D authoring package, have gone to Adobe.

The latter is particularly significant for Metastream, as Adobe has agreed in return to support Metastream 3 in all its ecommerce and web development products.

CONTACTS

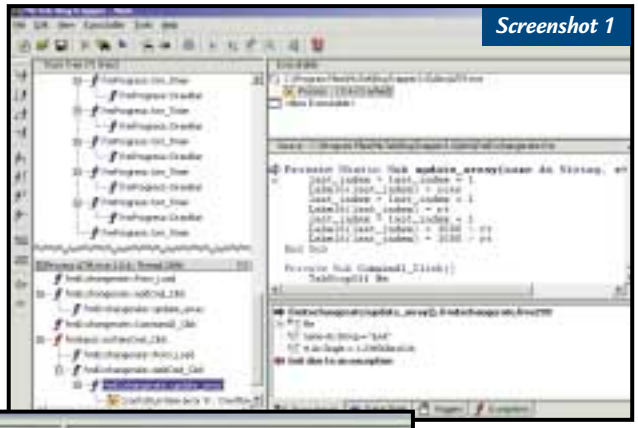
Benjamin Woolley welcomes your comments on the 3D Graphics column. Contact him via the *PCW* editorial office or email:
3d@pcw.co.uk

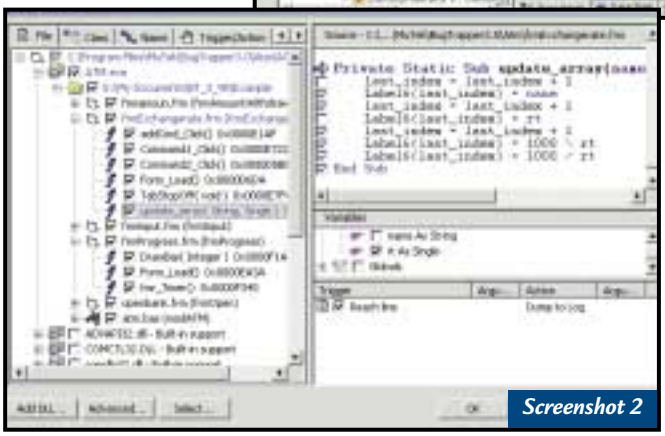
Genius fly trap

Tim Anderson goes bug tracking and sings the praises of timer events.

Debuggers make it easy to set breakpoints in an application and step forward through the code. The one thing you cannot do is to go the other way, and step back through code. At the same time, this is often what you really want to know. When tracking a bug, knowing the state of the application immediately before the bug appeared is usually important.

BugTrapper is a debugging tool based on one simple idea. If an application logs its progress as it runs, then you can trace back through the log as well as forward through a debugger. It also opens up possibilities such as having users email a log to the developer in the event of a problem. Then the developer can see exactly what code was running when the user hit a problem, rather than relying on vague descriptions such as, 'it crashed when I was doing the accounts'. BugTrapper 3 includes full support for Visual Basic for the first time.


Screenshot 1


Screenshot 2

Left: Tracing a crashed VB application with BugTrapper Below: Setting trace options in BugTrapper

Screenshot 1 shows BugTrapper analysing the trace for a crashed VB application. The Trace Tree in the left panel shows the procedures that ran immediately before the crash. The source code in the middle right panel shows the source for the currently selected procedure. The variables panel below it shows the values of the variables immediately before the crash. The crash occurred in a procedure called update_array. The interesting point here is that the same procedure ran shortly before the crash without error. By selecting this previous occurrence in the trace tree, you can see the values of the variables as they were when the procedure ran successfully, and compare them to those in the instance that crashed. This is an example of how you can go back in time.

BugTrapper maintains a buffer which fills up after a time, so there are limitations. However, you can also log to a file for complete information, subject to available disk space. You can also ask BugTrapper to create a log only in the event of a crash or other specified event. When the crash occurs, BugTrapper dumps its buffer to a log. Most important, you can configure exactly what you want BugTrapper to trace, to avoid getting unnecessary information (see screenshot 2). You can include or exclude specific procedures, and even drill down to the line level to set options. These options can be saved to TCI (Trace Control Information) files. These are vital when you use another BugTrapper feature, the ability to do remote debugging. You can install a BugTrapper agent along with a TCI on a user's computer to create logs. The RCA (Remote Control Agent) is a more sophisticated agent that allows you to connect to it over TCP/IP. You can then connect remotely and watch the executable as it runs.

The developer can see exactly what code was running when the user hit a problem

In order to get full information from BugTrapper using Visual Basic, you have to compile with the Native Code, no Optimization and Create Symbolic Debug Info options selected. C++ users must also create .pdb files (the symbolic debug information), but can nevertheless compile in release mode. Commonly used system DLLs have built-in support, which means you do not need .pdb files to trace their code.

BugTrapper does not remove the need for other debugging tools. The ability to trace code is really its only feature, so you could not use it to catch memory leaks, for example. In some circumstances, though, it is extremely useful. The main downside is the price. In a professional environment, though, any effective debugging tool soon justifies its cost. A seven-day working evaluation can be

obtained from the BugTrapper site at www.mutek.com/download_frame.html.

Delphi and the Win API

Alan Hitchin asks: 'How do you launch other programs from a Delphi 3 application? I can do it in VB using Shell but I haven't been able to find an equivalent in Delphi.'

The easiest way is to use the API function ShellExecute. So for example, to run Notepad from a Delphi application:

```
ShellExecute(self.↙
handle,'open','notepad↙
.exe',nil,nil,SW_SHOW);
```

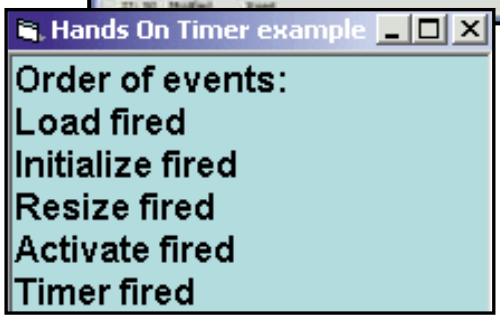
(*Key: ↙ code string continues*)

The only additional step you need for this to work is to add shellapi to the Uses clause of either the Interface or Implementation part of the Delphi unit. The reference to self.handle will work if you are calling the function from a form method, or alternatively you could use application.handle if there is no other convenient window handle to use. You can find the meaning of the other parameters in the Windows SDK help file supplied with Delphi.

In general, calling API functions is easier from Delphi than from Visual Basic. There is normally no need to declare the functions, as they are pre-declared in the supplied units. Note that the API uses pointers extensively. Delphi has full support for pointers but programmers just starting to do coding may not be aware of them. If you do not get the results expected, have a good look at the Delphi source files, such as shellapi.pas, along with the Windows SDK documentation. Some recent or rarely-used API functions may not have been declared, in which case you need to add your own declarations.

Tricks with timers

Windows is an event-driven operating system, which can lead to some tricky problems when you need to ensure that code runs at exactly the right time. A classic example is trying to validate values in form controls by handling focus events. It is easy to end up with nasty loops. Control A loses the focus to Control B, and fires its Lostfocus or KillFocus event. The Event Handler finds a problem and sets the focus back to Control A, thus firing the LostFocus event for Control B, which finds a problem and... you can guess the rest. In Visual Basic this is particularly awkward because of the unpredictable behaviour of GotFocus and LostFocus.



Top: Use ShellExecute from Delphi to run other applications
Above: Timers are an easy solution to tricky event handling problems

Another example is where you want to echo changes between two controls. For instance, you might have a Grid control and several Edit controls. You want the contents of the Edit controls to reflect the current row of the grid. If you modify the text in the Edit controls, the grid updates and vice versa. The snag is, the Change Event for the Edit control fires the Change Event for the Grid and disaster strikes.

A third case is where you want code to run immediately after an application has opened, perhaps in response to a command-line argument. If you have complex startup code, this can get tricky. In Visual Basic, forms have Initialize, Load, Activate and GotFocus events, any of which may seem good candidates for startup code. Delphi forms have OnCreate, OnShow, and OnActivate. Then there is the Resize event which often fires as well. How do you ensure that the code you add for the command-line argument, perhaps to open a document, really does run last?

In most cases, there is some combination of events and code that does what you want, but finding it can be a headache. You can often save much effort by using a timer instead. Timers are simple controls that fire just one event. They have two important properties, Enabled and Interval. The Interval property can be between 0 and 64,767 milliseconds, with 0 disabling the timer. Although it sounds fantastically precise, it is not, since the system generates only 18 ticks a second. The other precision problem is that if the system is busy, the timer event may not fire when you expect. In the above examples, this is not important. What matters is that the timer can run code that does not have unwanted side-effects.

If you are validating form controls, for instance, have the timer run validation code, pop-up alerts, and change the focus if required. If you want to echo changes between a grid and other edit controls, have the timer keep the two up to date at regular intervals. If you want to run code after an application opens, put it in a Timer event. To ensure that it only runs once, the first line of code in the event handler can disable the timer.

The main problem with the timer approach is that it can drain resources. Longer intervals reduce this, while it's better still to have the timer disabled except when necessary. For example, if you are validating data entry and concerned about performance, have the Timer event code disable the timer, but use the KeyPress event in each edit control to enable it again. Now the timer event will only fire if the user is actively editing. Used carefully, with one eye on performance, timers are an easy and elegant solution.

CONTACTS

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BugTrapper costs from £440.63 (£375 ex VAT), details are at www.mutek.com

Unwrapping XHTML

How do you make X hit the spot? Tim Anderson explains and checks out client-side JavaScript.

Many people are not aware that the current W3C (World Wide Web Consortium) recommendation for HTML is not HTML 4.0, or even HTML 4.1, but XHTML. But what on earth is XHMTL? The answer is a variant of HTML that qualifies as a well-formed XML document.

All these mark-up languages are related, in that they all stem from SGML (Structured Generalised Mark-up Language). Broadly speaking, SGML and XML offer a set of rules for defining document types, while HTML is an already-defined document type. Therefore it should be possible for an HTML document also to be a valid XML document. Unfortunately it isn't, because HTML as used does not follow the rules. For example, in XML all elements must have opening and closing tags. In HTML, this is not the case. Tags like are understood to have an implicit , while <br> and <img> are empty elements. <img> qualifies as an empty element because its content is defined by its own attributes, not by separate content that follows the tag.

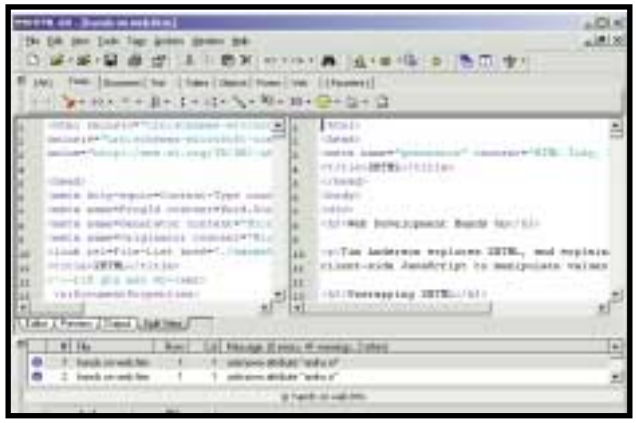
The idea of XHTML is to reformulate HTML as an application of XML. The clever bit is that carefully written XHTML should work satisfactorily in an HTML browser. Internet Explorer 5.0 and higher understand XML, but Netscape will not be XML-compliant until version 6.0 (there is no version 5.0). The W3C recommends that even now new web documents should be authored as XHTML.

Figure 1 shows a simple XHTML document. If you know HTML, it will look familiar. There are just a few points to note. The first line, beginning <!DOCTYPE, declares what type of XML document this is by referring to its DTD (Document Type Definition). The second point is that the <html> tag includes an xmlns (namespace) attribute. Namespaces are a key feature of XML. Since XML is by definition extensible, tags or elements are only understandable by reference to the DTD (or schema) where they are declared. On occasion though, you might want to use elements from several document types within a single document. XML namespaces let you identify which document type an element belongs to. The syntax is:

```
namespace:element
```

To avoid having to qualify every element, you can declare a default namespace. In XHTML, the root element is html. Declaring the namespace for this sets it as the default for the document.

After that what you see is pretty much standard HTML. That does not mean you can convert HTML to XHTML simply by changing the header details. XHTML is stricter and more disciplined. All tags, for example, must be in lower case and attribute values must be in quotes. In most browsers you can get away with



HTML-Kit and HTML Tidy extract HTML from a Word export

```
<img src=mypic.png>
```

but this is illegal XHTML. Another issue concerns empty elements. The results of constructs like
</br> are unpredictable, so the solution is to use the empty element syntax, <br />.

Part of the thinking behind XHTML is to clear up a fundamental problem in HTML. This is the way that content tags have become mixed up with presentation tags. For instance, is a content tag denoting a meaningful block of text, while <font> is purely a presentation tag. The correct way to handle presentation is through CSS (Cascading Style Sheets) or XSL (eXtensible Style Language), although the latter is not ready for prime time. The leap to complete abandonment of presentation elements is a big one, so the W3C has defined three levels of XHTML. The Strict level has no tags like <font> or attributes like bgcolor. Transitional XHTML includes these elements, while Frameset has frameset features. Currently the Transitional level is the most widely used, for compatibility with HTML.

Moving to XHTML

There are several tools to help you get the XHTML habit. HTMLTidy from the W3C site is a validation and conversion tool. TIDY.EXE is a highly configurable command-line application, and passing it the -help argument lists the options. You can also set up a configuration file. Tidy will clean up HTML exported from Word. It will also convert a document to

FIG 1 **Simple XHTML**

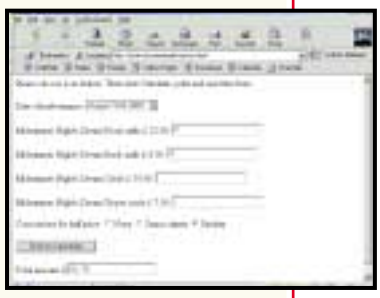
```
<!DOCTYPE html
    PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>Basic XHTML Example</title>
  </head>
  <body>
    <p>This is as simple as it gets.</p>
  </body>
</html>
```

(*Key:* ↙ *code string continues*)

FIG 2

Selling tickets online with client-side scripting

```
<html>
<head>
<title>Script calculations</title>

<script language="JavaScript">

<!--
function testValid(fieldObj) {
 if (isNaN(fieldObj.value)) {
 alert(fieldObj.value + " is not a valid ↙
number")
 return false}
 else {
 return true}
}

function numVal(sValue) {
 if (sValue == "") {
 return 0}
 else {
 return parseInt(sValue,10) }
}

function calcprices() {
 with (document.ticketform) {
 testValid(MNFStalls)
 testValid(MNBStalls)
 testValid(MNCircle)
 testValid(MNUCircle)
 }

var totalprice = 12.00 * ↙
numVal(document.ticketform.MNFStalls.value)
totalprice = totalprice + (8.50 * ↙
numVal(document.ticketform.MNBStalls.value))
totalprice = totalprice + (10.00 * ↙
numVal(document.ticketform.MNCircle.value))
totalprice = totalprice + (7.50 * ↙
numVal(document.ticketform.MNUCircle.value))
 if (document.ticketform.↙
concession[0].checked) {
 document.ticketform.totalbox.value = ↙
totalprice}
 else if (document.ticketform.↙
concession[1].checked) {
 document.ticketform.totalbox.value = ↙
totalprice/2}
 else if ↙
(document.ticketform.concession[2].checked) {
 document.ticketform.↙
totalbox.value = ↙
totalprice/2}

}

//-->
</script>

</head>
<body>
<p>Please choose your tickets. Then click ↙
Calculate, print and send the form.</p>
<form name="ticketform">
<p>Date of performance: <select ↙
name="perfdate">
<option>August 10th 2000
<option>August 11th 2000
<option>August 12th 2000
</select></p>
<p>Midsummer Night's Dream Front stalls ↙
&pound 12.00: <input type="text" ↙
name="MNFStalls"><br>
<p>Midsummer Night's Dream Back stalls ↙
&pound 8.50: <input type="text" ↙
name="MNBStalls"><br>
<p>Midsummer Night's Dream Circle &pound ↙
10.00: <input type="text" ↙
name="MNCircle"><br>
<p>Midsummer Night's Dream Upper circle ↙
&pound 7.50: <input type="text" ↙
name="MNUCircle"></p>
<p>Concessions for half price:
<input type="radio" name="concession" ↙
value="None" CHECKED>None
<input type="radio" name="concession" ↙
value="Senior citizen">Senior citizen
<input type="radio" name="concession" ↙
value="Student">Student
</p>
<p><input type="Button" value="Click to ↙
calculate" onclick="calcprices()"></p>
<p>Total amount: &pound<input type="text" ↙
name="totalbox" value="0.00"></p>
</form>
</body>
</html>
```



Client-side scripting used to calculate ticket prices

use CSS, but don't expect perfect results. To ask Tidy to convert to XHMTL, type:

```
tidy -asxml old.html > new.html
```

Tidy will also issue warnings and error messages, which you can optionally redirect to a file. The command-line Tidy is great if you want to include it in your own scripts or batch files, but not so convenient when you are working in an editor. There are a several other options. TIDYGUI.EXE is a Windows application that wraps Tidy. Configuration is via a tabbed dialog and you can load and save configuration details.

Another nice way to use Tidy is via the excellent free-to-use editor HTML-Kit. This can be extended with plug-ins, and one of these is for HTMLTidy. When installed, you can validate using Tidy simply by pressing F9. Under Actions, Tools, HTML Tidy other option include stripping surplus tags from Word 2000. When invoked, the converted document appears in a split view alongside the original. You can copy all or part of the converted document back to the original.

Online validation

You can validate XHTML online. If your web page is on the Internet, add a link to: http://validator.w3.org/check/referrer. If it is stored locally, visit: http://validator.w3.org/ and upload your page for checking. Sadly, the majority of web pages on the Internet would not get past the validator, and you can have some fun entering popular URLs to prove it.

IP addresses via ASP

Steve Scott asks if there's any way to trace the IP address of the client through ASP.

ASP makes it easy to retrieve this kind of information, via the Request object's ServerVariables collection. Figure 3 shows a script that outputs this back to the client, and screenshot 1 shows the results.

Script calculations

Louis Maule-Cole's website allows people to order concessionary and standard tickets for the local theatre. He would like the total price of the tickets to come up automatically.

This is the sort of problem that scripting is designed to solve. To make the ticket page, the neatest job would involve some server-side scripting. For example, using Active Server Pages (ASPs) you would have a Submit button on the form that would send it back to the server for processing. Then you could generate a confirmation page with the ticket summary and cost and return it to the browser for printing.

Many users, though, want something simpler that can be used on ordinary webspace without server-side scripts. In this case, you can use client-side scripting (see figure 2 on the previous page).

This consists of several elements. The starting point is a form, which in this case does not have any action or method attributes, since all the processing is client-side. Within the form are several input boxes, where the user enters the number of tickets required. There is also a drop-down menu for choosing the date, and a radio button for selecting a concession. When the form is complete, clicking the Calculate button runs a JavaScript function that is defined in the <head> section of the document. You must use JavaScript, not VBScript, or you are restricting users to Internet Explorer.

The form includes four object types: a select object, several input objects, a radio object, and a button. In each case, a name attribute allows reference to the objects in script. For the button, there is also an onclick attribute. This is how you attach an event handler to an HTML object. When the button is clicked, the calcprices() function is called.

This begins by testing the validity of the values that have been entered. The testValid function uses the isNaN 'Not a Number') function to check that the input boxes contain numbers. Next, the script calculates the cost of the tickets. In case the user entered a fractional value, the numVal function uses parseInt to return just the integer value of the field. Because parseInt may return NaN when passed an empty string, there is a separate test for this that returns zero.

The final stage looks at the value of the radio button, by treating the buttons as an array and inspecting the checked property of each element. It would be easy to give different discounts.

In JavaScript, everything is case sensitive. And be careful not to confuse the assignment operator (=) with the test for equality (==). For example,

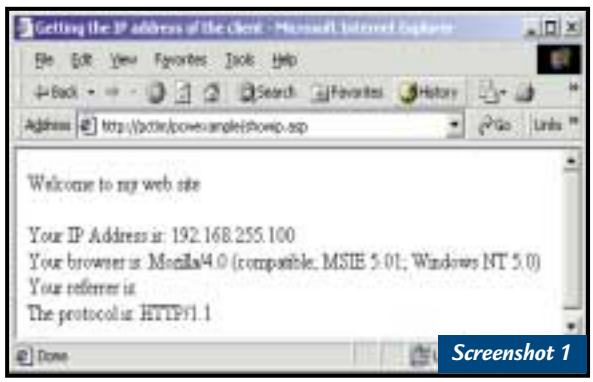
```
if myvar = 3
```

always returns true, meaning that the value 3 was successfully assigned to myvar.

The two main advantages of client-side code are that there are no repeated trips to the server, and that, since it is programming against the DOM (document object model), the results are smoother than with typical server-side programming, which returns a completely new page. The main problem is that IE and Netscape Navigator have substantial differences in the DOM they expose, but with the release of Navigator 6.0 this will improve. The simple code shown works in both IE and Navigator 4.0 and higher.

FIG 3 **Finding IP address through ASP**

```
<%@ Language=VBScript %>
<html>
<head>
<title>Getting the IP address of the client</title>
</head>
<body>
<p>Welcome to my web site</P>
<% Response.write "<p>Your IP Address is: " + ↙
Request.ServerVariables("REMOTE_ADDR")+ "<br />"
Response.write "Your browser is: " + ↙
Request.ServerVariables("HTTP_USER_AGENT")+ "<br />"
Response.write "Your referrer is: " + ↙
Request.ServerVariables("HTTP_REFERER")+ "<br />"
Response.write "The protocol is: " + ↙
Request.ServerVariables("SERVER_PROTOCOL")+ "<br /></p>" %>
</body>
</html>
```



Screenshot 1 *Mystery of the IP address solved*

CONTACTS

Tim Anderson welcomes your comments on the Web Development column. Contact him via the PCW editorial office or email: **webdev@pcw.co.uk**

For the latest on HTML, browse www.w3.org

TIDYGUI: http://perso.wanadoo.fr/ablavier/TidyGUI/

HTMLTidy: www.w3.org/People/Raggett/tidy/

HTML-Kit: www.chami.com/html-kit/

Recommended XHTML reading: *Beginning XHMTL* (Wrox Press) ISBN 1-861003-43-9

Available from www.amazon.co.uk

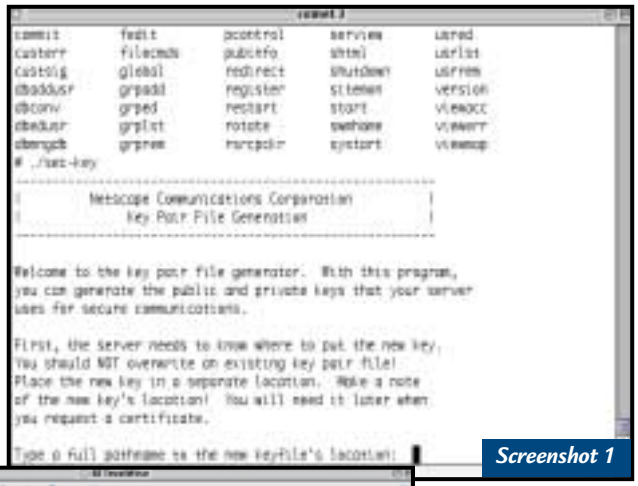
Security blankets

In his first outing as *Hands On*'s minister for ecommerce, Nigel Whitfield wins a certificate.

We cover a lot of Internet issues in the *Hands On* section, but the one that is really exploding at the moment is ecommerce, and that's why *PCW* has decided to introduce a dedicated column on the subject. Ecommerce – or 'ebusiness' as some prefer to call it – is likely to affect everyone in some way, whether you run your own company, manage the technology for a larger organisation, or just want to find an emergency plumber at 8pm on Christmas Eve.

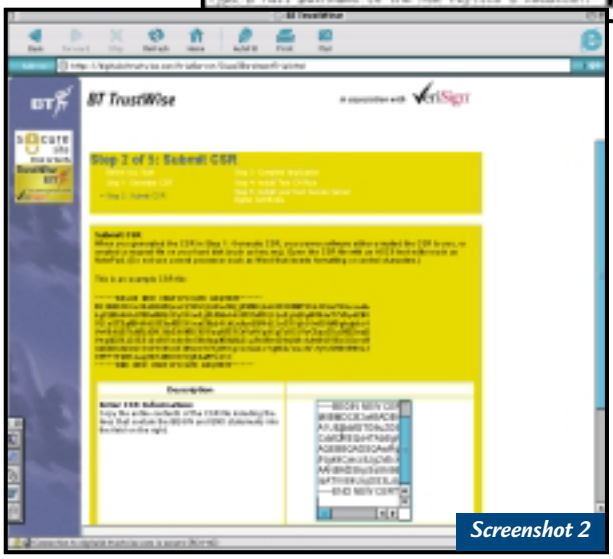
So what will we be covering in this column? Ebusiness is more than just large websites processing thousands of credit card transactions. It's about using the technology of the Internet to promote your business, gain new clients, or deal with suppliers and customers more efficiently. Ecommerce could be as simple as a website providing people with an up-to-date check on stock levels and prices, or as complicated as full settlement of invoices between you and your suppliers, online ordering and secure transaction processing.

In this new section, we'll be covering a wide range of ecommerce solutions, but concentrating on the tools, products and techniques that are most useful to smaller companies and organisations. Hopefully, whether you want to use Internet marketing, or create your own online shop, you'll find help and advice here – and if you have comments or suggestions for things that you'd like to see covered in this part of the magazine, please send them in to the address at the end of the column.



Screenshot 1

Left: The first stage in getting a certificate is generating a server key



Screenshot 2

Your web server uses public key cryptography to generate a Certificate Signing Request for you

Are you certified?

Whether you want to provide a safe shopping environment, or just allow access to documents on a site without the possibility of anyone being able to intercept them, a secure certificate is vital. It gives people the confidence of knowing that any information they submit to your site, or receive from it, has been encrypted and can't be tampered with, or intercepted, along the way.

You can get a server certificate from a number of places, but typically you have to pay – and if you're just at the development stage of a project, you might not want to do that just yet.

BT Trustwise – which works with Verisign, one of the top authentication outfits – has a solution in the shape of test certificates, which are free of charge. Each one lasts for a fortnight, and you don't have to do anything more onerous than fill in a few forms on the website. However, you must not use them for a live application and to help ensure that they are just for testing, each web browser that you want to test a site with will need a special Verisign test root authority installed as well.

If you want to do ecommerce 'for real', then you'll still need to pay for a certificate and provide the appropriate information to have it verified, but this is a good way to let you test your site configuration in the meantime.

You can sign up for a test certificate at www.trustwise.com – it's largely a matter of filling in the forms, as long as you're using one of the servers that's listed. (In fact, you should be OK with some others – although the only Netscape server listed was Enterprise Server, we had no problems requesting and installing a certificate for Netscape FastTrack Server).

How certification works

Before going into the details of how to install and configure a certificate, let's look at the security model. Firstly, a secure server typically communicates via a different port – 443, rather than 80. The URLs people type will begin https:// to indicate that it's a secure link. All the information that passes between browser and server is encrypted in both directions. The website supplies a

certificate, which a 'root authority' in your web browser verifies as valid, and this is then used to encode and decode information.

As long as your web browser has root authority allowing it to verify the server's certificate, people don't need to do anything to see the site – and all up-to-date browsers will have the necessary certificates built in, barring a few that expired at the end of 1999.

Back on your server, there are two pieces of information. The first is a server key file, and the second is the certificate. The key file contains binary data, which can be unlocked with a password.

As the first stage of getting a certificate, you'll need to generate this key file. Screenshot 1 shows what you'll see when you use a Netscape server under Unix; the TrustWise site gives instructions for other servers and operating systems.

It would, of course, be foolish to send either the server key, or its password, to anyone via the Internet when you want a certificate. Instead, the server itself, or a utility program, turns the key file and information about your organisation, including the server's domain name, into a Certificate Signing Request, or CSR.

That request is just a block of letters, with a start and end line that you can copy and paste into the TrustWise website – some web servers will let you automatically email the CSR to an appropriate authority (screenshot 2). For the TrustWise trial, you can do everything over the web, so tell your server or its CSR- generating program to display the data, or email it to yourself, so you can copy and paste it.

When you've copied the CSR data into the form on the TrustWise site, click the Continue button. You'll have to supply some additional information about your site, including contact name and address. When you're applying for a real certificate, this is the sort of information that will be checked thoroughly to ensure that only trustworthy people have certificates. For the trial, you'll just see a few messages as your application is processed.

The next stage is to install the test root authority in your web browsers; it'll be done automatically if you follow the steps on the TrustWise pages. Confusingly, when you've added the certificate, you'll still be stuck on the 'Step 4 of 5 page' with Step 5 tantalisingly unavailable. Don't worry – Step 5 is installing the certificate on your web server and that's not something that's covered on the BT website.

You'll receive the certificate via email instead. It'll look something like this:

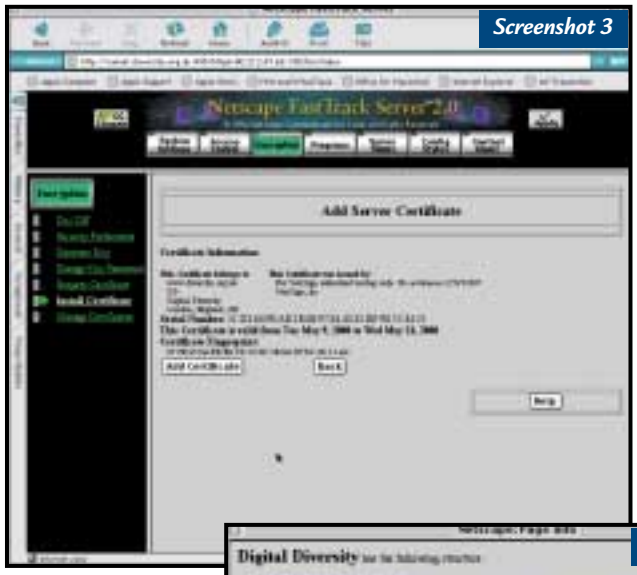
-----BEGIN CERTIFICATE-----
MIICGTCCAcMCEFHTY/CuHgiXhEMyv
5hVNFUwDQYJKoZIhvcNAQEEBQAwg
akxFjAUBgNVBAoTDVZlcmlTaWduLCB
JbmMxRzBFBgNVBAsTPnd3dy52ZXJpc
2lnbi5jb20vcmVwb
3NpdG9ye
S9UZXN0Q1BTIEl
uY29ycC4gQnkgUmVmLi
BMaWFiLiBMVE
QuMUYw

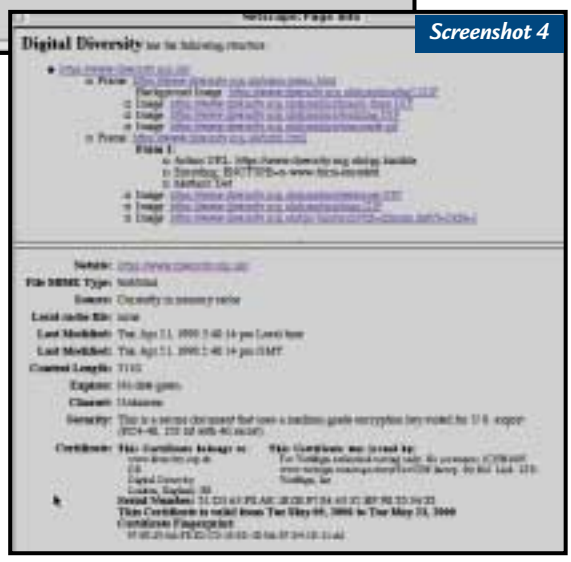
with a corresponding 'END' line. All you need to do is copy and paste the block into your server's configuration system; with a Netscape server, that's done via a web page, and others will have similar techniques – check the documentation for your secure server (screenshot 3).

Remember you'll also have to switch on encryption in your server if it doesn't happen automatically after adding the certificate, and if the server was running beforehand on port 80, it'll now be on port 443. And that's just about all there is to it – you should have a server that's now delivering documents and accepting input from forms over a secure link (screenshot 4).

Whether it's a test certificate free of charge from TrustWise, or a full annual certificate – at around £260 – it really isn't much work at all to make your web server secure – and that's the first step to being able to do business on the Internet with confidence.

It would, of course, be foolish to send either the server key, or its password, via the Internet





Left: Adding the certificate to your server is a matter of copy and paste, then filling in a few details on the configuration form
Below: Netscape's Page Info shows the site is secure and gives details of the certificate

CONTACTS

Nigel Whitfield welcomes your comments on the Ecommerce column. Contact him via the *PCW* editorial office or email **ecommerce@pcw.co.uk**

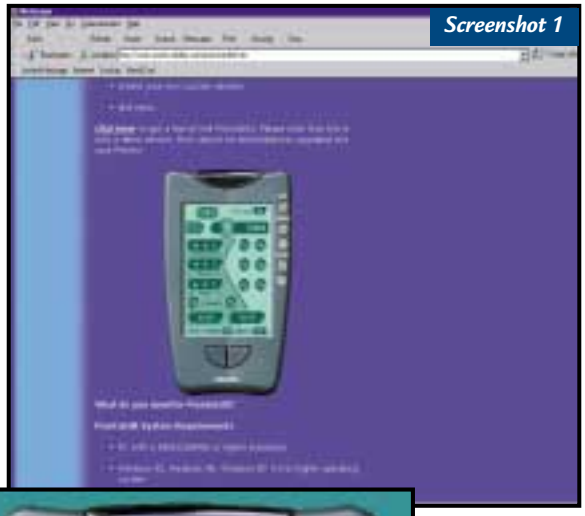
Infra-red conundrums

Mark Whitehorn relives the pain of connecting Psions and PCs and trains a remote control device.

I know you've heard it all before, but someone has to keep saying it. Connecting Psions to PCs can still be painful. If a connection can be established, then backing up and restoring data is usually easy. However, synchronising data still seems to cause grief, both to me and to others.

For example, Graham Townsend (townsend01@clara.co.uk) used to have no problems transferring and converting files between his PC and Psion Series 5. However, he now gets messages that there are no file associations and no convertors loaded. He's tried reinstalling PsiWin and loading all elements of Office 2000 in case the convertors are there somewhere. None of this seems to have helped. The backup still works so he can protect his data but, he says, 'it would be nice to be able to work on it as well'. I've suggested upgrading to the most recent version of PsiWin, but my heart isn't in it because the version he has was working at one stage. Graham's is the second email I've received on the subject this month. Come on, Psion, some of us are really suffering – please look at this problem. Even a set of diagnostic programs (one for the Psion and one for the PC) to help work out where the problem lies would be a step forward.

The strange thing is that the Psion community seems to split into those plagued by connectivity problems and those for whom connectivity is a trouble-free breeze. They must wonder what we are all crying about. So, to keep things balanced, we'll look at a positive aspect of the Psion connectivity toolset, IR (infra-red).



Left: www.pronto.philips.com – home of the amazingly adaptable hand controller
Below: Using the emulator to generate a program for the Pronto

Seeing (infra-) red

All Psions since the 3c come with a built-in IR port – that's the good news – but all are not equally endowed, as only the Series 5 complies with the Infra-red Data Association (IrDA) standard.

Printers, mobile phones, laptops and PCs can all come with an infra-red port. Hewlett-Packard and Canon offer a range of printers with this option, and even if your printer doesn't have an IR port, it's possible to plug in a device that acts as an infra-red sensor. There are several around: the ACT-IR200L/220L from ACTiSYS (www.actisys.com) and the LiteLink from Parallax Research (www.parallax-research.com/litelink.html).

Some new GSM mobile phones from manufacturers such as Ericsson and Nokia support IrDA and the Series 5 can communicate freely with these to send faxes, emails and so on. Series 3 and Sienas, however, cannot. Adherence or otherwise to the IrDA standard also means that, while a 5 can only talk to another 5, the 3c, 3mx and Siena can converse among themselves.

Communication with PCs and laptops is slightly tricky and you'll need software for the PC and for the Psion:

- Windows 98 users need the IrDA driver from the Win98 CD
- Windows 95 users should locate a copy of version 2.0 of Microsoft's IrDA driver
- Series 3 and Siena users with a technical bent may be able persuade PsiWin to work, but it's not an officially supported operation. Third-party software is available from Jim Pollock (www.geocities.com/siliconvalley/lakes/3947/) for copying, backing up or inspecting directories via infra-red
- Series 5 users have a somewhat easier ride, needing only the latest drivers from Psion, which come with Message Suite 1.52, though PsiWin 2.1 or later must also be installed on the PC
- Communication with Macs, including iMacs, is not supported.

Files can only be sent between machines singly or as fragments, such as a highlighted section of text from a word processor, an entry from an Agenda file or a block of cells from a spreadsheet. Infra-red communication has a short range: machines should be no more than a metre apart with a clear line of sight between the ports. The optimal distance, however, is around 15cm.

The good news is that the IR control does work well – and consistently, as far as I can see.

Couch potato

Since IR is also used to control household appliances, can you get your PDA to control the TV?

The answer appears to be 'no' at present if you use a Psion, but 'yes' if you

Screenshot 3

Left: Lights, camera, action

have a Palm device or a Mips-based CE device. Check out http://hp.vector.co.jp/authors/VA005810/remocon/premocce.htm for details. You can also now go the other way and turn your TV controller into a PDA.

Several months ago I wrote about wearable computers and how gadgets, such as mobile phones, GPS units and PDAs, were bound to end up all integrated into the same device. Never in my wildest dreams did I consider the inclusion of a TV remote controller in that grouping for the simple reason that most of us don't carry one around all day. But once again the world has been able to out-weird me.

Philips' Pronto, featured in June's *Gadgets* section (www.pronto.philips.com), started life as a single device that replaced the clatter of remote control handsets that hide themselves around our living rooms (under the sofa, in the dog's basket and so on). It has a touch-sensitive screen and IR port and can 'learn' the functionality of your existing handsets (screenshot 1, previous page). So far, totally un-weird.

However, it can also be programmed via an emulator, ProntoEdit, (screenshot 2, previous page) that runs on a PC and thus you can persuade it to perform all sorts of tasks that you wouldn't normally expect from a remote control, such as controlling your lighting (screenshot 3) and remembering your preferences (screenshots 4 & 5). But people have also written Agenda applications for it and you can even store recipes on it. Perhaps in the future, celebrity chefs will beam recipes to you from your TV... and you can beam the list of ingredients to your local supermarket... and you can emerge beaming from the kitchen with sun-dried balsamic Kohlrabi.

Personally, I think all this is wonderful: give us an adaptable tool and we'll adapt it 'til its pips squeak. Remember all those letters written with Lotus 1-2-3?

The emulation software is available in two flavours, as a fully-functioning package and as a demo version with which you can write programs, but with no means of communicating between the emulator and a hand controller.

ProntoEdit requires a PC with a 486DX/66MHz or higher processor running Win95/98/NT4 or higher, 16MB of RAM and a serial port supporting 115200 baud. Philips has supplied *PCW* readers with a demo version that you'll find on this month's cover disc.

Other sites of interest are www.remotecentral .com (screenshot 6) and www.prontoedit .com/.

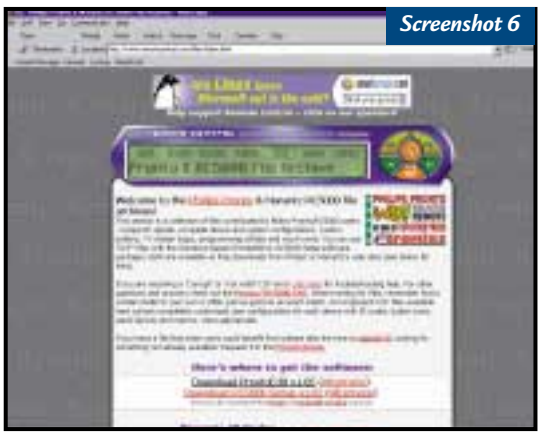
Harry Kyriacou, Philips' UK product marketing manager, said that the company was astonished (and delighted) by what was being done with the product. He was astonished all over again by the fact that the product was selling so well (almost exclusively) on the Internet. The combination of easy development and a band of enthusiastic Internet users seemed to be the main factor encouraging sales.

Screenshot 5

Screenshot 4

Selecting your personality...

I find this last point interesting. Here is a product, not an especially earth-shaking or ground-breaking product, that's developing a momentum from the enthusiasm of users by means of the Internet without much intervention from the manufacturer. In sharp contrast, Microsoft has employed people with the word 'evangelist' in their job titles to do just this. These people were perfectly happy to tell me that their job was to use the Internet to generate enthusiasm for the PocketPC. For some reason this makes me uncomfortable. I think Pocket PC is a good product, but I don't like being told to think so by a 'product evangelist'.


Screenshot 6

www.remotecentral.com offers all sorts of wares

CONTACTS

Mark Whitehorn welcomes your comments on the PDA column. Contact him via the *PCW* editorial office or email **pda@pcw.co.uk**

Primed for privacy

Secure connections over the Internet are cheap and needn't be complicated, explains Roger Gann.

A virtual private network (VPN) is a private data network that uses the public Internet to transport data, but uses a tunnelling protocol and other security methods to keep your data safe. A VPN can be used instead of a network of owned or leased lines that can only be used by one company.

The idea behind a VPN is to give a company the same capabilities as a leased line, but at a much lower cost, by using the shared public Internet, rather than a private network. They also let companies' network bods link multiple offices via the Internet both reliably and securely.

So how do VPNs work? A virtual private network consists of the two computers (one at each end of the connection) and a route, or tunnel, over the public or private network. Suppose, for example, you want to access the resources on your corporate LAN, but only have an Internet connection. With virtual private networking, you can 'tunnel through' the Internet to access those resources. Similarly, two physically separate LANs can be linked by a VPN 'tunnel'.

In Windows 98, virtual private networking is implemented using the Point-to-Point Tunnelling Protocol or PPTP. This allows you to tunnel through TCP/IP-based data networks to securely access resources on remote servers. It also supports multiple network protocols (IP, IPX, and NetBEUI). You can use PPTP to provide secure, on-demand, virtual networks by using dialup lines, LANs, WANs, or the Internet and other public, TCP/IP-based networks.

Because of its dependence on PPP, PPTP relies on the authentication mechanisms within PPP, namely password authentication protocol (PAP) and challenge handshake authentication protocol (CHAP). There is a strong tie between PPTP and Windows NT, so MS-CHAP, an enhanced version of CHAP, uses information within NT domains for security. Similarly, PPTP can use PPP to encrypt data, but Microsoft has also incorporated a stronger encryption method called Microsoft point-to-point encryption (MPPE) for use with PPTP.

Aside from the relative simplicity of client support for PPTP, one of the protocol's main advantages is that PPTP is designed to run at open systems interconnection (OSI) Layer 2, or the link layer, as opposed to IPSec, which runs at Layer 3. By supporting data communications at Layer 2, PPTP can transmit protocols other than IP over its tunnels. PPTP does have some limitations. For example, it does not provide strong encryption for protecting data nor does it support any token-based methods for authenticating users.

The networking technology of PPTP is an extension of the remote access PPP protocol. It's a network protocol that encapsulates PPP packets into IP data for transmission over the Internet or other public TCP/IP-based networks. Using a VPN involves encrypting data before sending it through the public network and decrypting it at the receiving end.

An additional level of security involves encrypting not only the data but also the originating and receiving network addresses. Microsoft, 3Com and several other companies developed the PPTP and it first appeared in Windows NT Server 4.0. Its initial acceptance was reinforced by the inclusion of a PPTP client in a service pack for Windows 95.

PPTP isn't the only VPN protocol kid on the block, there are three others: Layer 2 Forwarding (L2F), Layer 2 Tunnelling Protocol (L2TP), and IP Security Protocol (IPSec). PPTP, L2F and L2TP are largely aimed at dialup VPNs, while IPSec's main focus has been LAN-to-LAN solutions.

L2TP is being designed by an IETF working group as the heir apparent to PPTP and L2F, designed to address the shortcomings of these past protocols and become an IETF-approved standard. L2TP uses PPP to provide dialup access that can be tunnelled through the Internet to a site. However, L2TP defines its own tunnelling protocol, based on the work done on L2F.

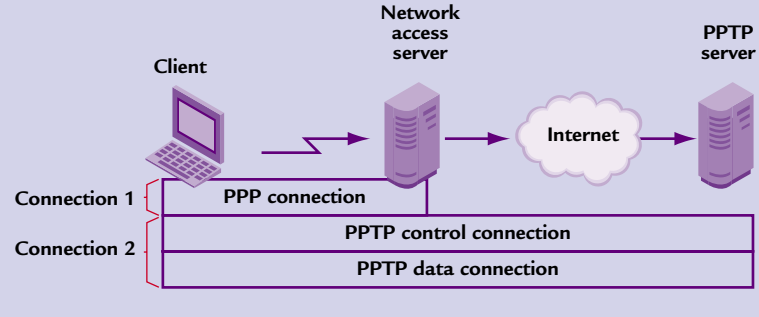
Planning for a VPN

A common VPN scenario involves a remote or mobile Windows 98 client that uses a local ISP to access the Internet. The client then tunnels through the Internet to a corporate LAN.

A Windows 98 client actually makes two connections to establish a VPN tunnel: one physical connection and one logical connection. This is why you see two DUN adaptors in your Network Properties when you install VPN under Windows 98: VPN Setup installs a second dialup adaptor and the 'network driver interface specification wide area network' (NDISWAN) protocol for the virtual private networking adaptor. The second dialup adaptor appears in the Network option in Control Panel as Dial-Up Adaptor #2 (VPN Support).

The diagram below illustrates the two connections. The client first uses Dial-Up Networking and the remote access protocol, PPP, to connect to the ISP. Once connected, the client can send and receive packets over the Internet.

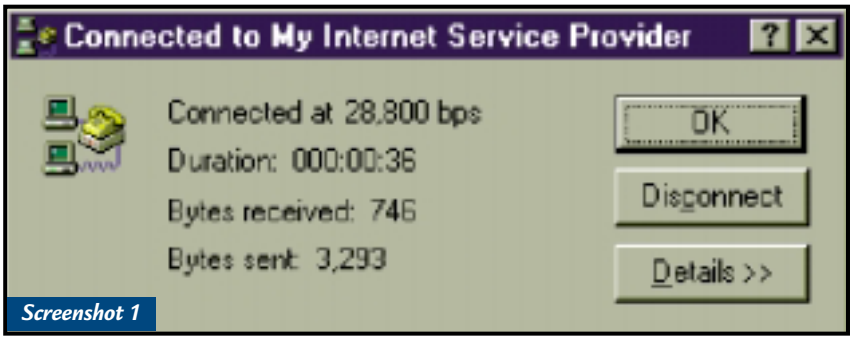
How Windows 98 connects to a VPN

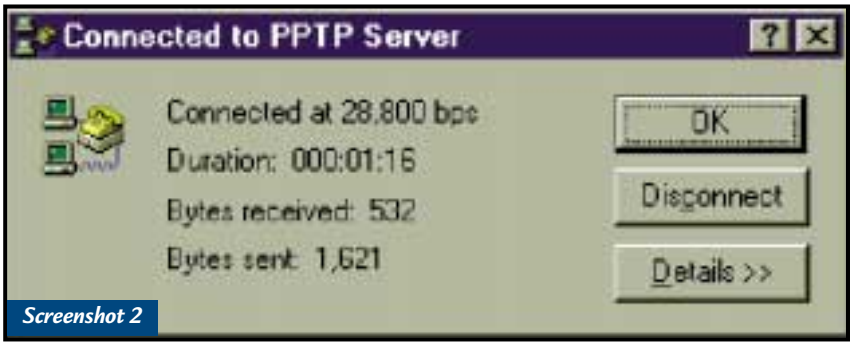


The client then makes a second logical connection over the existing PPP connection. Data sent using this second connection is in the form of IP data that contains PPP packets, referred to as encapsulated PPP packets. The second connection creates the VPN connection to a VPN server on the private enterprise LAN (for example, a computer running Windows NT Server 4.0 and configured as a VPN server). This connection is referred to as a tunnel.

When the VPN server receives the packet from the routing network, it sends it across the private network to the destination computer. The VPN server does this by processing the PPTP packet to obtain the private network computer name or address information in the encapsulated PPP packet. The encapsulated PPP packet isn't restricted to the TCP/IP protocol – it can carry multiprotocol data such as IP, IPX, or NetBEUI protocols.

A neat feature of VPNs is that they don't require any changes to existing network configurations or network-based applications – they allow you to retain your existing network protocols, network node addresses and naming schemes on the private enterprise network. For example, IPX or NetBEUI clients can continue to run applications on the private network that require these protocols. Neither are changes required for name resolution methods used on the private network, such as WINS for NetBIOS computers, DNS for TCP/IP host names and SAP for IPX networking.





Connecting a VPN server is a game of two halves – link to the ISP and then connect

PPTP isn't the only VPN protocol kid on the block, there are three others

Configuration

If you have a permanent TCP/IP connection, such as a LAN connection to a VPN tunnel server, and you want to connect to a remote network that is connected to your VPN server, you need only configure the connection to that VPN tunnel server.

However, it'll be necessary to configure two connections if you want to connect your workstation to a remote server by tunnelling through the Internet, the connection to your ISP and a tunnel connection to the VPN server on the target network. If VPN is not already installed on your Windows 98 remote PC, add it as a Network Component in the usual way – add a new adaptor, the Microsoft Virtual Private Networking Adaptor.

You create a VPN connection as you would a new DUN connectoid, except that you're actually going to create two connections, the first using a network adaptor, modem, or ISDN device to connect to a remote access server on the Internet or your intranet, while the second connection uses the VPN virtual adaptor to tunnel through the first connection to a VPN tunnel server and beyond.

So click the 'Make a New Connection' icon to launch the wizard. Fill in the usual details but make sure you select 'Microsoft VPN Adaptor' in the 'Select a device' list. The wizard will then prompt you for the host name or address of the VPN server.

With virtual private networking, you can connect your workstation to a remote network by tunnelling through the Internet to a VPN server on that network. To do so, you must make two connections. First, you must connect to the Internet through an ISP. Next, you must create a tunnel to the target network.

As you'd expect, connecting to the VPN server is a two-stage affair. First you connect to your ISP in the normal manner, eg double-click the appropriate DUN connectoid and enter your user name and password in the 'Connect To' dialog box. Once that has completed successfully, you double-click on the VPN DUN connectoid you've just created, entering the user name and password as prompted and clicking the Connect button.

You now have two connections, as shown in screenshots 1 and 2 above.

After you connect successfully to the VPN server on the remote network, the ISP routes all traffic sent from your workstation over the Internet to the VPN server. The VPN server then routes the traffic to the correct computer on the remote network. Consequently, you see only computers and servers on the remote network. You no longer 'see' the Internet unless the remote network itself provides access to the Internet.

CONTACTS

Roger Gann welcomes your comments on the Networks column. Contact him via the *PCW* editorial office or email:
networks@pcw.co.uk

PERSONAL COMPUTER WORLD BUYERS' CHARTER

MAIL ORDER PROTECTION SCHEME (MOPS)

When you order goods as a *private* individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser, which subsequently ceases to trade and goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the 'Buyers' Charter', qualify for compensation, providing:

1. You have not received the goods or had your money returned.
2. You have followed the *Personal Computer World* guidelines when placing your order (see opposite).
3. You have taken all reasonable steps to effect delivery or refund.
4. You have retained irrefutable proof of purchase, for verification purposes:

a) A copy of the original advertisement from which the goods were ordered.
b) Comprehensive proof of payment.

GUIDELINES

Claims must be submitted so as to arrive 'NOT EARLIER THAN TWENTY-EIGHT DAYS AND NOT LATER THAN THREE MONTHS' from the official on-sale date of the magazine. Claims must be submitted to the Customer Services Manager IN WRITING, summarising the situation and lodged strictly within the time schedule stated. *Claims received outside this period will not qualify for consideration for compensation under the 'Buyers' Charter'.*

Once a supplier who has advertised in this magazine has become subject to either Liquidation or Bankruptcy proceedings and upon completion of all winding-up procedures, *Personal Computer World* guarantees to expeditiously process those *private* individual readers' claims made and submitted, in accordance with those procedures outlined, up to the following limits.

a) £2,000 in respect of any claim submitted by one Private Individual Reader.
b) £100,000 in respect of all advertisers so affected in any one year.

These sums define the Publisher's maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the Publisher's discretion.

As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the 'Buyers' Charter' will be subject to reprocessing and will take into account any shortfall which may then exist. Payments under the scheme will also take into consideration the obligations and liabilities of other interested parties, such as credit card and/or insurance organisations, etc.

EXCEPTIONS

This guarantee only applies to advance postal payments made by *private individuals in direct response for goods itemised/illustrated in display advertisements*. It does not cover goods ordered from advertising Inserts or Cards, classified advertisements or MicroMart, or Catalogues obtained from, or supplied by, any advertiser regardless. *Similarly, protection does not exist in relation to purchases made as a result of reviews and/or editorial comment.*

The 'Buyers' Charter' is designed to safeguard the *PRIVATE individual reader*. It does not provide protection to any companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. Neither is cover provided for orders placed from, or to, any overseas suppliers or for goods purchased for resale.

CAVEAT EMPTOR

Readers are reminded that the Mail Order Protection Scheme was solely implemented to provide protection to the private individual when goods are ordered 'Off the Page' and paid for by post. *It was not designed for, nor will it offer any protection, in the event whereby goods are purchased via the Internet.*

CREDIT CARD PROTECTION

Always pay by credit card when ordering goods valued in excess of £100, thereby ensuring maximum protection in the event that an advertiser ceases to trade prior to such goods actually being received.

DISCLAIMERS

Readers are reminded that the opinions expressed, and the results published in connection with reviews and/or laboratory test reports carried out on computing systems and/or related items, are confined to, and are representative of, only those goods as supplied *and should not be construed as a recommendation to purchase*. Whilst every precaution is taken to ensure that reliability and good business practices prevail, the Publisher cannot be held responsible for the overall trading activities of any supplier referred to, or advertising within, this publication.

HELPING HAND

Each month ***Anthony George****, our* ***customer services manager****, gives advice on what to watch out for when buying computer equipment off-the-page.*

When borrowing money or buying goods on credit, the interest charges together with the total cost of the loan must be clearly set out in writing before you sign the agreement.

This can be expressed in two ways:

- As a flat rate – the annual interest as a percentage of the total amount borrowed.
- As an annual percentage rate (APR).

An APR gives a clearer indication of the true rate of interest on a loan or credit agreement, which is usually repaid monthly, because it takes into account the fact that you are paying the same amount of interest each month even though the debt itself is becoming less. An APR quotation therefore makes it much easier for you to compare the cost of different types. Under the *Consumer Credit Act 1974* lenders are required, by law, to quote an APR for all short-term borrowing.

An APR is also intended to include – although it does not always do so – other costs of borrowing during the year, such as annual fees or charges. As there are various types of borrowing, APRs are calculated differently and are reflected accordingly:

- Overdrafts are quoted with an APR based only on the interest rate being charged – any account charges are not included.
- Personal loans are quoted with an APR based on interest and charges, but credit insurance premiums are not included.
- Credit cards are quoted with an APR that does not take into account whether interest is charged from the transaction date or the statement date.
- A mortgage at a reduced 'discount' rate for, say, the first three years may be shown with an APR that only applies to that period – even if your contract ties you with the same lender for much longer. When the discount period ends, the APR will fluctuate in line with the standard variable rate.

As well as the interest charge and APR all other costs, such as arrangement fees or administrative costs, must be quoted before you enter a credit agreement, even if unconnected with the credit. With a mortgage, for example, you must be given details of related insurance or survey charges. If you think that you have been misled, immediately contact your local Trading Standards Office.

Anthony George, Customer Relations Department, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG

Order form

PERSONAL COMPUTER WORLD

Use this form when you order by phone, fax or post.

SUPPLIER'S DETAILS

COMPANY .....

SALESPERSON'S NAME .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....

ORDER REFERENCE NUMBER (IF QUOTED) .....

DESPATCH REFERENCE NUMBER .....

CUSTOMER DETAILS

NAME .....

COMPANY .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / .....

ORDERED BY: ☐ TELEPHONE ☐ FAX ☐ POST

ADVERT APPEARED IN PCW:

ISSUE DATE ..... **PAGE** .....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

METHOD OF PAYMENT

☐ PERSONAL CHEQUE ☐ PURCHASE ORDER ☐ CREDIT CARD

☐ C.O.D ☐ DEBIT CARD ☐ OTHER (SPECIFY) .....

CARD COMPANY .....

ISSUE NUMBER (debit cards only) .....

START DATE ..... / ..... / ..... EXPIRY DATE ..... / ..... / .....

CARD NUMBER ..... / ..... / ..... / .....

SUB-TOTAL _____

DISCOUNT _____

CARRIAGE _____

SURCHARGES _____

VAT _____

TOTAL _____

SIGNED .....

DATE ...../...../.....

DAYTIME TELEPHONE NUMBER .....

DELIVERY ADDRESS .....

.....

..... **POSTCODE** .....

AGREED DELIVERY DATE ..... / ..... / .....

Purchasing Guidelines

There are several steps you can take to help ensure that the buying process is smooth and trouble-free. We'd like to suggest these main guidelines:

• KEEP RECORDS

When you phone a supplier, make a note of the name of the person you speak to, and when. Note down any claims they make for the product in which you are interested, or any specifications they mention. If you are unsure that what they are offering is right for the task, then ask.

• GET A FULL SPEC OF THE MACHINE

Before you place an order for a machine, insist on being faxed or emailed a full specification, detailing all components and peripherals. Check what is included: for example, when buying a printer, are all cables and cartridges bundled in? If you've used a review in a magazine to guide your decision, make sure that what is quoted matches what you have read. Sometimes, machine specifications can change from the model sent for review.

• BE CLEAR ABOUT SUPPORT AND WARRANTIES

Make sure that you get a warranty that suits your needs and is fully detailed in the quotation. If you need swift repairs, consider paying extra for an eight-hour repair service. Also make sure you understand the level of service you can expect to receive, including who pays for couriers if your machine has to be returned for repair.

• USE CREDIT CARD PROTECTION

When you place your order, use a credit card. The Consumer Credit Act ensures that credit card purchases between £100 and £30,000 are covered. Check the address to which the goods will be sent. Often, if you buy with a credit card you can only receive the goods at the address on the card. If you are buying over the Internet, make sure you are using a secure server, sometimes denoted by the prefix 'https'.

• SET DELIVERY DATE AND CHECK WHAT IS DELIVERED

This gives you some comeback if the goods are not delivered on time. When the goods arrive, check the packaging before you sign for them, to guard against damage in transit.

Faxback Service

Missed a feature or a review? Try our 24-hour faxback service.

Updated every month, our easy-to-use Faxback service gives you instant access to a complete range of product reviews, features and workshops via your fax machine.
To use the service, simply follow the instructions below.
Calls are charged at 50p per minute at all times, with an average duration of four minutes.
Our service is available 24 hours a day, 365 days a year.
(The faxback service is not available outside the UK).

1 From the choices below, select the article(s) you wish to receive. Note the number of pages in the article.
2 Using the handset on your fax machine, dial 09065 600632. If you do not have a handset, press the fax machine's On Hook or Telephone button, then enter 09065 600632 on the keypad.
3 There will be a vocal introduction to the Faxback service which will ask you to enter the code of the article(s) you require. The voice will then ask you to press the Start/Send button on your fax machine.
4 The article(s) you have requested will then come through your fax machine.

IMPORTANT INFORMATION

In order for the faxback service to function correctly, you must have your machine set to use tone dialling (you may find that you need to switch your machine from 'pulse' to 'tone').

Should you have any problems with the *Personal Computer World* faxback service, please call 0870 909 0113. This helpline is open from 9:00am to 5:30pm, Monday to Friday and calls are charged at the standard rate.

Other articles are available for faxback. For a full list please enter the code 2000 (3 pages).

Faxback Table

PCs and Notebooks	Issue	Pages	Code
PII *vs* PIII PCs	June-99	13	2011
Budget PCs	September-99	11	2013
Notebooks	September-99	8	2014
AMD Athlon PCs	October-99	10	2016
Ultimate home PCs	November-99	12	2017
Small business PCs	December-99	12	2018
Turbo PCs (11 compared)	March-00	11	2019
PCs for £999	February-00	13	2020
Hardware Group Tests	**Issue**	**Pages**	**Code**
3D graphics cards	June-99	6	2119
PDAs and handhelds	July-99	10	2120
Communications hardware	August-99	11	2121
Inkjet printers (budget, small business and photo)	October-99	11	2122
Scanners	November-99	8	2123
Monitors (17in and 19in CRT)	November-99	5	2124
Graphics cards (21 cards compared)	December-99	15	2125
Digital cameras (22 cameras compared)	January-00	15	2126
Best of 1999 PCs – 11 *PCW* winners fight it out	January-00	11	2127
Laser printers	February-00	12	2128
Motherboards (30 models compared)	March-00	17	2129
Hard drives	April-00	10	2130

PCW Faxback number: 09065 600632

Faxback Table (cont'd)

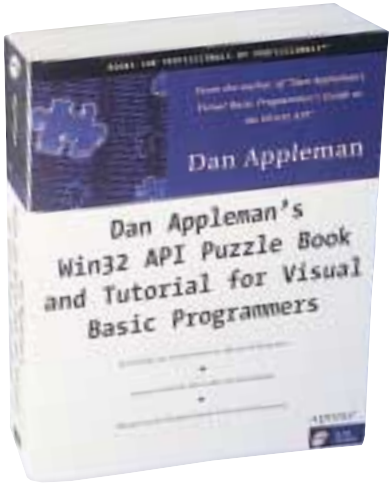
Software Group Tests	Issue	Pages	Code
20 Top Utilities	October-99	8	2221
Accounting software	November-99	9	2222
Web editors (10 packages compared)	December-99	9	2223
Image-editing software	January-00	11	2224
Speech recognition (4 packages compared)	January-00	5	2225
DTP	March-00	10	2227
Databases	February-00	12	2228
Visual programming tools	April-00	9	2229
Hands On	**Issue**	**Pages**	**Code**
Linux part 1	January-99	3	2313
Linux part 2	February-99	3	2314
Linux part 3	March-99	3	2315
Website construction part 1	March-99	3	2316
Website construction part 2	May-99	3	2320
Website construction part 3	June-99	3	2322
Multiple boot	July-99	2	2323
Setting up a webcam	December-99	2	2326
DIY dual-Celeron PC	January-00	3	2329
Calculating loan interest	February-00	2	2331
Programming with Perl	February-00	3	2333
Web development – displaying live data using ASP	February-00	2	2334
Publishing data without an online database	May-00	2	2335
The new brood of digicams	May-00	3	2336
Small Business Workshops	**Issue**	**Pages**	**Code**
Building a small network	September-98	5	2402
Ecommerce for small business	October-98	5	2403
Building your own web server	November-98	6	2404
Hubs and network starter kits	February-99	4	2407
Firewalls and net protection	March-99	3	2408
IT training for your small business	April-99	4	2409
Backup solutions for your small business	May-99	4	2410
Building a five-user network	September-99	5	2412
Setting up an email server	October-99	5	2413
Remote working	October-99	5	2414
Be a millionaire on the web	February-00	4	2417
All-in-ones vs phone, fax & modem	February-00	3	2418
Ecommerce – setting up your business on the web	March-00	7	2419
50 website tips	April-00	6	2420
WAP workshop	May-00	4	2421
General Features	**Issue**	**Pages**	**Code**
Office 2000	June-99	5	2519
Anti-virus	August-99	5	2521
Memory	August-99	2	2522
Upgrading	December-99	6	2524
Windows 2000	February-00	5	2525

PCW Faxback number: 09065 600632

The PCW Bookshop

Personal Computer World brings you a selection of IT-related books that we think will be of interest to our readers, with a discount on the recommended retail price, plus FREE delivery (within the UK) direct to your door. See opposite for details of how to place your order.

Discount on recommended retail price



WIN32 API Puzzle Book and Tutorial for Visual Basic Programmers

This long-awaited complement to Dan Appleman's bestseller shows programmers how to turbocharge VB by describing how to control the entire Windows API. The book is primarily for VB6 programmers, but includes a VB5 source code tree as well.

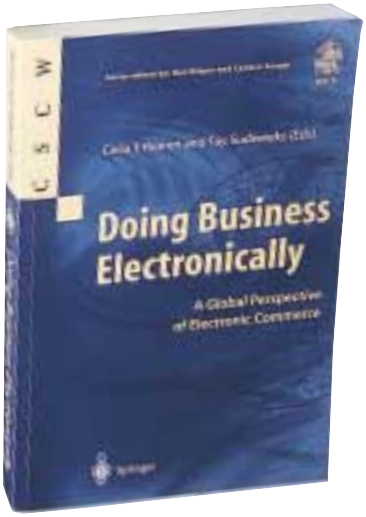
Author: D Appleman; 483pp plus CD-ROM

RRP £24

PCW reader price £21.60

PCW subscriber price £19.44

ORDER REF SPR01



Doing Business Electronically: A Global Perspective of Ecommerce

This book covers three main areas of concern to business today: how to join, manage and benefit from the Internet revolution. It will be of interest to anyone who is interested in how to buy or sell on the Internet.

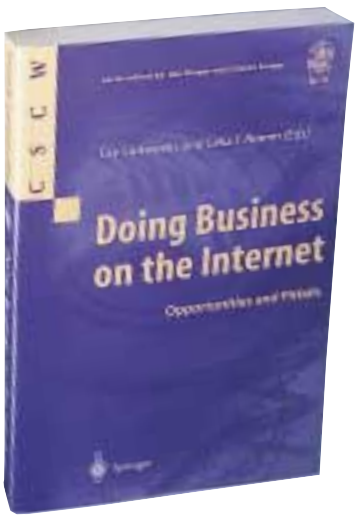
Edited by Celia T Romm & Fay Sudweeks; 208pp

RRP £29.50

PCW reader price £26.55

PCW subscriber price £23.90

ORDER REF SPR02



Doing Business on the Internet

This covers all the major aspects of electronic commerce – general, commercial, social and cultural – addressing issues such as the implications of real-time transactions for financial institutions; integrity and security; and how networked communities can benefit from global collaborative systems.

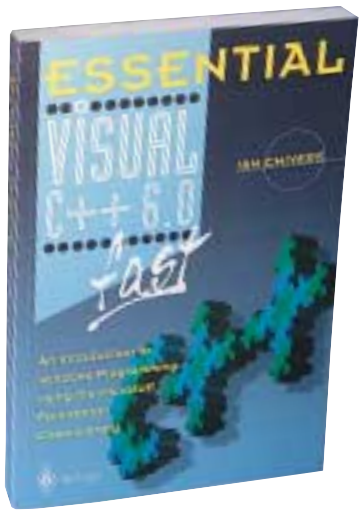
Edited by Fay Sudweeks & Celia T Romm; 296pp

RRP £35

PCW reader price £31.50

PCW subscriber price £28.35

ORDER REF SPR03



Essential C++ 6.0 Fast

Microsoft's Visual C++ 6.0 contains lots of new features designed to help developers build high-performance applications. This book gives a quick introduction to Windows programming using C++ and the Microsoft Foundation Class (MFC) library. Essential Visual C++ 6.0 Fast will help you create your own applications quickly and effectively.

Author: Ian Chivers; 224pp

RRP £14.95

PCW reader price £13.46

PCW subscriber price £12.11

ORDER REF SPR04

Essential Java 2 Fast

A complete introduction to Java 2, this book will show you how to take advantage of Java 2's new features (such as the abstract windowing toolkit and the swing classes) for creating graphical user interfaces. It is designed for professional developers or students who need to learn the maximum in the minimum time.

Author: John Cowell; 256pp

RRP £14.95

PCW reader price £13.46

PCW subscriber price £12.11

ORDER REF SPR05

PCW ON CD-ROM

PCW Collectors' CD-ROM No 15

The *Personal Computer World* Collector's CD-ROM contains every news item, product review, *Group Test* and *Hands-On* article from 24 complete back issues of *Personal Computer World*, giving you nearly 5,000 pages of quality editorial on a single CD-ROM. All articles appear on screen exactly as they appeared in the magazine and the whole CD is fully searchable, browsable and printable in Acrobat format. And what's more, it takes up just a fraction of the space on your shelves.

PCW reader price £14.95
PCW subscriber price £13.45
ORDER REF CD15

CD 15 includes JULY 1998 to JUNE 2000

CD-ROM wallet

Keep all those stray cover CDs in order with a *Personal Computer World* CD Wallet. Produced in heavy-grained black PVC with a velcro fastening and a silver *PCW* logo, this wallet holds and protects a total of 10 CDs.

PCW reader price £4.75
PCW subscriber price £4.30
ORDER REF WAL01

CLEARANCE OFFER!

HOW TO ORDER

Phone us on **01858 438 886**
Fax your order to us on **01858 468 969**
Email your order (with credit card details) to **pcw@subscription.co.uk**
Post your order to:
Personal Computer World, Reader offers, Tower Publishing Ltd, Sovereign Park, Market Harborough, Leics LE16 9EF

Photocopied coupons will be accepted if you do not wish to cut up your magazine.

Order ref	Item	Reader offer price per item	Subscriber * price per item	Quantity	Total price

• **Please add £3.50 for postage and packing for orders outside the UK**
• **Please allow 28 days for delivery**

Total of order: £

Name: _____
Address: _____
_____
_____
Postcode: _____
Daytime telephone: _____
Email address: _____

Signature: _____
Date _____

I enclose a cheque/postal order for £ _____ payable to VNU Business Publications Ltd

OR please charge my ☐ MasterCard ☐ Amex ☐ Visa

Credit card no. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry date _____

*** Only subscribers to Personal Computer World are entitled to these discounted prices.**

*If you would like to subscribe to *PCW* and benefit from these discounts, call the Subscription Hotline on 01858 438 885 and quote SUBRO.

• *Please tick here if you do NOT wish to receive information about other products and services from VNU Business Publications Ltd* ☐
• *Please tick here if you wish your details to be passed to other carefully selected companies for marketing purposes* ☐

Coupon code 08-00

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Oni

Oni, the third-person shooter, in development by Bungie, made a splash at this year's E3Expo. You play Konoko, a special agent of the Tech Crimes Task Force given the task of infiltrating a crime syndicate. With its linear plot, it might appear that there's not much to separate Oni from the rest of the herd. But it looks as if the similarities stop there.

For a start, you can forget the puzzle-solving antics of adventure: Oni will be all action. And whereas running out of ammo in Quake will leave you a sitting duck, having your hands free in Oni will allow you to practise your martial arts. You learn these skills, so at the beginning you may only have a few moves at your disposal, but when you hit the advanced levels, your full-contact acrobatics could be your deadliest weapon.

The cinematic animation of Japanese anime lends itself perfectly to the fluid world of Oni. So, while in Tomb Raider, if you get Lara to hop, skip and jump, you have to wait for each action to finish before the next can begin, in Oni the actions blend together seamlessly. Also adding to the realism is the high polygon count of the character models.

The environment you'll be fighting in has been designed by architects, giving a sense of real space, and the AI of the non-playing characters includes moods and motivation, as well as cunning. For the true anime fans, levels will be book-ended by cut scenes and, finally, net play is also planned in arena-modelled levels.

Look out for a full review on its release this winter.

http://oni.bungie.com

MATT WHIPP

Black and White

There's been a lot of talk about Peter Molyneux, creator of Populous and the follow-ups of this genre, and his Lionhead studio's debut release, Black and White. It looks like this game will allow you to really stamp your personality on a world while stamping out everyone else's.

At the beginning you enter a perfect island world, where tribes of innocents go about their business, until you arrive as a god and mess it up. The overall aim of the game is to get as many tribes to worship you as possible, giving you power and spells.

As the title suggests, there are two sides to this sword of government, and you can rule over your congregation with a reign of terror or by making everything nice and fluffy. Being too extreme in either direction will land you in trouble. The 3D environment will reflect the tone of your rule: the land will be torn apart under evil, for example.

You walk among your people by taking a Familiar – an animal that you nurture and train to do your bidding. As you grow in power, so your Familiar mirrors this, and you could end up in charge of a 400-foot tortoise. But this is no puffed up Tamagotchi. The Familiar will also lead and defend your tribes when you come up against another deity.

The interface is almost non-existent, and you move around by simply grabbing a bit of land and cast spells by throwing them at your enemy.

The multiplay capabilities look awesome, with chat rooms where your creature will speak what you type, as well as conventional server-hosted combat zones. You can also look forward to fully editable world and gameplay parameters.

Originally posted for a Christmas 1999 release, Black and White has been delayed by some last-minute tweaking, so we'll just have to hold on a bit longer.

www.blackandwhite.ea.com

MATT WHIPP

Metal Fatigue

If you're worried the realtime strategy genre is getting rusty, try this game and think again.

These days it's difficult to find a realtime strategy game that stands out from the crowd and it's even more difficult to talk about a strategy game without mentioning the Command & Conquer series, which has dominated the genre for so long.

Any game that brings a new twist to an old idea adds a certain value and will be welcomed by gaming fans. Luckily, Metal Fatigue brings with it enough freshness to make it worth having.

The best aspect of the game is the combots you can build to do your bidding. These hulking forms are much larger than vehicles such as the tanks and missile carriers and are also much more destructive. They sound like Robocop when they walk and can be equipped with a number of different weapons, such as katana sword energy blasters, or legs and arms that fire missiles.

These combots will make up your main form of attack, but are most effective when backed up by other vehicles such as hover bombers, mobile artillery and the single-shot, self-destructing Nemesis. These smaller vehicles also cost a lot less to build and make good sentries for your bases, while your combots go off around the planet to take on the enemy.

This isn't just unexplained violence: the conflict begins when explorers, using faster-than-light travel in the 23rd Century, find alien technology. This belonged to a race called the Hedoth and is very advanced, but none of the equipment found actually works. Three CorpoNations – RimTech, Mil-Agro, and Neuropa – form an alliance and set off in search of functioning technology.

You follow three brothers who start off life serving RimTech, but when an artifact is discovered, the alliance breaks down. One brother fights for RimTech, one defects to Neuropa and the other is captured by Mil-Agro and forced to fight for them. This extends the playability of the game, with the ability to play each of the brothers and each of the factions, following a different storyline each time.

These games tend to be fairly tough to get into and there's nothing to be gained by loading it up all gung-ho and ignoring the manual. There are a lot of aspects to master and to stand a chance of beating either human or computer opponents you'll need to know what you're doing.

A voiceover that sounds like the female commentator in the movie *Dune* keeps you up to date with what is happening in each scenario, prompting you when structures have been built or new vehicles produced. If you are short of some element to complete a task, this will tell you what is missing. For example, when you build vehicles or structures you need people to run them. If your cryo farms aren't producing enough manpower you won't have drivers for your vehicles or combots and they'll be unusable.

One of the problems with games of this nature is that you can't just play it for half an hour as it takes so long to build up your forces. The designers have given this issue some thought and come up with a 'pre-build' system to put yourself in a strong position to start off with. When playing against friends or AI opponents you can set the level you want to start at and then spend a certain number of credits to get a foothold in the game. You can also set the time you've got to spend this initial bonus, so there's no sitting around while your opponents painstakingly place each piece of armour or new structure.

Overall, Metal Fatigue is an excellent game and realtime strategy fans will be glad of a great addition to this genre. There's nothing better than watching a gang of your combots stomp their way across the screen and destroy the enemy, especially the smaller and weaker vehicles. Watch out for the attack of the Nemesis units though.

MATT CHAPMAN

DETAILS

★★★★★

RECOMMENDED Personal Computer World

PRICE £29.99 inc VAT

CONTACT Take 2 Interactive 01753 854 444

www.metalfatigue.net

SYSTEM REQUIREMENTS Pentium 200 (233 recommended), 32MB of RAM, 4MB 3D card, Windows 95/98

Starlancer

Ever fancied engaging the enemy in a laser-equipped starship? Now's your chance – chocks away!

The year is 2160, and the Solar System is in the grip of a war between the old Cold War adversaries of the second half of the 20th Century. Your job in this conflict is to fly fighters with the 45th Volunteers, a rag-tag Alliance squadron battling the forces of the evil Coalition.

Chris and Erin Robert's Digital Anvil, along with co-developers Warthog, have gone for a total immersion approach with Starlancer and it works to great effect. A spectacular first-person, pre-rendered bunker area means that for the entire time you have the game loaded, you really feel part of the action – there is nothing to force you back to reality as you move seamlessly between the simulator and the briefing room.

This is only half the story, though. Once launched on a mission, Starlancer seamlessly switches between the action you are involved in to in-engine cut-scenes, adding a further cinematic feel. There is only one problem with this – after you are killed and have to redo a mission, you are forced to patiently sit through the cut scenes as there is no escape option. This small niggle aside, the scenes work exceptionally well, drawing you right into the narrative.

The fighters are excellent. They have a retro, World War II feel about them. Some even have a Gatling gun lookalike, along with a revolving turret like the kind on the top of Lancaster bombers. The markings are good, with the various nationalities reflected in the liveries. For example, the Japanese ships are adorned with rising suns, while the Russians ships have the traditional red star.

The cockpit view is semi-virtual, reflecting movements your head would probably undergo in space combat on the screen. For example, your head is forced backwards under acceleration and is also buffeted by the effects of missile blasts.

As for playability, the in-game simulator gets you up to speed with the controls and Heads-Up-Display. This is good, as you can quickly get into playing the game instead of spending hours trying to get to grips with flying your ship. The controls are a little spongy in Starlancer and lack the response of the ships in Freespace 2. However, with a bit of trial and error, a ship that handles to your liking can be found.

The game's most enjoyable aspect is dogfighting with the evil Russian fighter pilots. Liberal taunting from your opponents adds to your enjoyment as you twist and turn to get on their tail before unleashing your guns. Generous use of the match speed control is a necessity here if you are to get close enough to pepper their hull with your weapons.

The smoke from a damaged fighter is a marvellous effect, blocking your vision as you manoeuvre your crippled adversary into your sights for the final pull of the trigger. The explosions in Starlancer are not as recurrently spectacular as they could be. This is a shame because when they're good, they're really impressive. Unfortunately, though, most of the time they are not much more than fireballs.

Starlancer is an excellent, plot-driven space simulator. The game is quickly playable and immediately absorbs you into the universe of the warring forces of the Alliance and Coalition in a very effective and cinematic way. Apart from the cut-scene irritation in replayed missions, this game is quite spectacular. You would do well to join the 45th and do your bit to aid the Alliance. See you out there!

SCOTT MONTGOMERY

DETAILS

★★★★★

RECOMMENDED PCW

PRICE £34.99 inc VAT

CONTACT Microsoft 0345 002 000

www.starlancer.co.uk

SYSTEM REQUIREMENTS Pentium 200 (Pentium II 300 recommended), 32MB of RAM (64MB recommended), 2MB or greater 3D card recommended, DirectSound 7.0 compatible sound card, Windows 95/98

Tachyon: The Fringe

This all-action space sim is truly of the future, as you'll need a PC with futuristic specs to play it.

In a move away from traditional military combat simulators, Novalogic has entered a new contender for the coveted crown of best space combat simulation. The other recent contender for this prize is Microsoft's Starlancer (see opposite page). Starlancer is an excellent game with good graphics, ships and gameplay. In our opinion, though, it didn't prise the crown from the aging fingers of Interplay's Freespace 2. The question is, did Tachyon: The Fringe do any better?

Tachyon's instruction manual is innovative and well presented. It takes the form of a tourist brochure – complete with recruitment adverts for factions in the game. The information in it is substantial and helps to create an intricate picture of the universe you'll be immersed in.

In Tachyon you play Jake Logan, a freelance pilot who scours space station notice boards looking for jobs. It's a simple existence. You escort ships, you attack ships, you make money. Then you spend it on a new ship that is better, faster and with a more powerful arsenal. From this perspective, Tachyon has returned to the Elite style, minus the trading side, and this is one of the best aspects of the title.

The story is novel and interesting. After a few jobs, Jake is framed for a crime he did not commit. He is tried, convicted and sent to The Fringe at the edge of the Solar system. It is here the game really begins as you decide with which faction to affiliate yourself, and which jobs to accept. These decisions dictate how the game will unfold. You have the option of hiring wingmen to help you complete your jobs. These non-player characters must be paid a percentage of the overall payment for each job. How greedy you are, or how much money you need dictates whether you use them, although once you become affiliated with a corporation, a wingman becomes a necessity, because at this point your opponents become more accurate and aggressive.

Tachyon is no more complicated to play than other space simulators. There are lots of keys to learn to move shields, target enemies and a plethora of other functions. However, included in the box is a colour-coded keyboard map that eases the learning process. A half hour or so should see you up to speed with most of the functions.

Controlling the fighter is a fine art. The controls are extremely sensitive. This sprightliness makes it difficult to get the enemy in your sights. Additionally, the match speed toggle doesn't make it easy to stay on a fighter's tail, so dogfighting isn't usually a matter of blasting your way through an enemy a minute. Dog-fighting is good, but it's just difficult.

At 1,024 x 768, the graphics in Tachyon are great. At this setting, the ships look amazing, the gargantuan space stations magnificent and the explosions spectacular. Unfortunately, this resolution will prove too much for most people. Running Tachyon on a Pentium III 450MHz with128MB of RAM and a TNT card, we found that the frame rate regularly dropped to a jerky, unplayable level. Reducing the resolution to 640 x 480 didn't help much. In the end, we had to switch off many of the features to keep the frames up.

So does Tachyon get the crown? Unfortunately not. Why? Because a high-spec machine is needed to do it justice, otherwise it looks mediocre and suffers from frame rate drops that verge on the unplayable. It's a real shame, because it could have been excellent.

SCOTT MONTGOMERY

DETAILS

★★★★

PRICE £34.99 inc VAT
CONTACT Novalogic 020 7405 1777
www.novalogic.co.uk
SYSTEM REQUIREMENTS Pentium 200 (Pentium III 450 or above recommended), 32MB of RAM (64MB recommended), 8MB graphics card (16MB recommended), DirectX 6-compatible sound card, Win 95/98

Lemmings Revolution

If your idea of revolution is going round and round then read on – the Lemmings need you.

This latest incarnation of the popular Lemmings game from Take 2 is, unfortunately, far from revolutionary. That's not to say it's not good or fun, or as addictive as the original, because it certainly is. It's just a repackaging and a technological update on the old classic, though. The biggest innovation is that the old wide-screen format has been replaced by a cylinder that can be revolved through 360 degrees.

As anyone who has played the original will know, the game involves the suicidal long-haired lemmings' inexorable march towards certain doom. Your role is to minimise the death toll by commanding individual lemmings to perform specific roles. All the old actions are there. There are climbers, builders, tunnellers and bombers, all of which must be strategically used in order to save the group.

In the original game, a click on a mini-map in the corner allowed instant

access to another part of the widescreen. This meant that you could quickly check the potential traps in another part of the map before immediately returning to what you were doing. In Revolution this has been lost. It's debatable whether this makes the gameplay better or worse, but it certainly makes the game more active, because if you don't keep revolving round the tower, you might easily miss a group walking off a cliff out of sight.

Lemmings Revolution is just as addictive as its predecessors and the 3D graphics look wonderful. The lemmings animation is excellent with their flowing green moppish hair and their giant feet. Unfortunately, it's just a reworking of the old idea. Having said that, if you don't mind this or didn't play the original then Revolution will certainly give you hours of addictive, time-consuming fun.

SCOTT MONTGOMERY

DETAILS
★★★

PRICE £34.99 inc VAT
CONTACT Take 2 Interactive 01753 854 444
www.take2games.com
SYSTEM REQUIREMENTS Pentium 166 (Pentium II 333 recommended), 32MB of RAM (64MB recommended), 4MB DirectX compatible 3D accelerator card (8MB recommended), DirectX-compatible sound card, Windows 95/98

Cricket 2000

Ah, perfect, the smack of leather upon willow and, if action is your thing, none of the boring bits.

Cricket 2000 is yet another incredibly realistic sports simulation from Electronic Arts. EA's attention to detail is meticulous and this will be the deciding factor as to whether or not you'll like this game. In other words, do you like cricket?

The game feels like any televised cricket match. It begins with your team line-up overlaid on the screen as the traditional wide-angle camera view overlooks the pitch. Slowly, the players walk out and take up their positions, exercise, stretch and polish the ball against their crotch.

Playing Cricket 2000 is enjoyable, bowling being particularly entertaining. Using the mouse, the position of the bounce is marked and spin options are selected. Then it's a case of trying to click the mouse button at the right time to achieve the desired spin and release the ball. It takes a bit of practice, but nothing is more satisfying than taking a wicket and watching the dejected batsman walk off slowly.

Another good feature is the commentary from Richie Benaud and David Gower. Seemlessly interlaced with the action, the commentary adds to the overall mood of the game as your good and bad moments attract a commentary or a round of applause from the crowd.

The best feature, though, is the ability to skip the slower parts. This allows you to choose whether you watch the game in real time, or whether you quickly move to the next bit you're involved in. As a result of this, the slow pace that plagues real life cricket can be removed, making Cricket 2000 an enjoyable game for both the buff and the action hunter.

SCOTT MONTGOMERY

DETAILS
★★★★

PRICE £34.99 inc VAT
CONTACT EA Sports 01932 450 000
www.easportscricket.com/
SYSTEM REQUIREMENTS Pentium 166 (Pentium II 233 recommended), 32MB of RAM (64MB recommended), 4MB graphics card (8MB 3D card recommended), Windows 95/98

Alphabet soup

In this month's brainteaser the numbers 1 to 26 have been allocated randomly to the letters of the alphabet. The letter values of the words have been added together to give the word values. For example, in VOLE, V might equal 16, O 6, L 7 and E 5, or any other combination of four letters totalling 34. What is the value of Z?

BOBCAT	47
CUSCUS	72
DONKEY	52
FERRET	38
GIBBON	57
GOPHER	58
GRISON	51
HAMSTER	60
HORSE	41
IBEX	48
JERBOA	49
KANGAROO	44
LORIS	42
MACAQUE	66
MARMOSET	63
MEERKAT	36
MONGOOSE	66
MUSKRAT	60
RABBIT	45
SAIGA	50
SERVAL	51
TARSIER	41
VOLE	34
WOMBAT	62
YAPOK	48

Find the solution to this puzzle for a chance to win a copy of Microsoft Encarta Reference Suite 2000.

Send the answer, along with your name and an address where you would like the prize to be mailed, on a postcard to: *PCW* Prize Puzzle (August 2000), VNU House, 32-34 Broadwick Street, London W1A 2HG, or by email to: letters@pcw.co.uk.

Answers should arrive no later than 20 July 2000. Please note that we DO NOT open attachments.

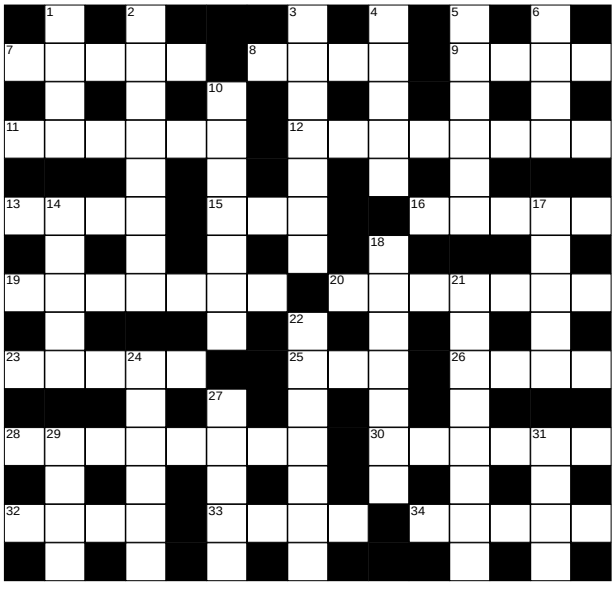
May's Prize Puzzle answer

We were inundated with entries for the 'Figure it out' puzzle, the answer to which is below.

Gordon Baker from Kent was the first one out of the hat and wins a copy of Encarta Reference Suite. Congratulations Mr Baker, your prize is on its way.

9	–	8	X	3	=	3
+		÷		X		
5	–	4	+	6	=	7
÷		+		÷		
7	+	1	÷	2	=	4
=		=		=		
2		3		9		

prize crossword

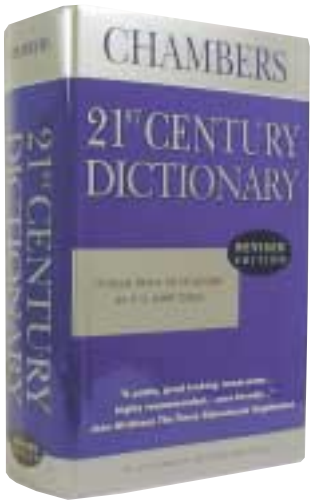


ACROSS

7 Programming language, often Visual (5)
8 Character's onscreen appearance (4)
9 Open and examine a file (4)
11 Get returned to email sender (6)
12 Protection against external virus threats (8)
13 Free and incomplete software version (4)
15 Net addressing system (abbrev) (3)
16 Processing mistake (5)
19 Explorer's recently visited option (7)
20 Attempted an operation again (7)
23 Spreadsheet boxes (5)
25 Common extension (abbrev) (3)
26 Unwanted email (4)
28 Accepted rules for communication (8)
30 Overall setup (6)
32 Net language (inits) (4)
33 Agreed operator (4)
34 Forms of carrying data, such as CD-ROMs (5)

DOWN

1 Saint's heavenly ring (4)
2 Journey indicator (8)
3 East Anglian county (7)
4 Severe (5)
5 Beer maker (6)
6 Cry like a baby (4)
10 Need (7)
14 Banish (5)
17 Musical drama (5)
18 Liberate (7)
21 Opposed fiercely (8)
22 Answered (7)
24 Small (6)
27 Wash thoroughly (5)
29 Speed (4)
31 Long film (4)



Each month, one lucky *PCW* Crossword entrant wins a copy of the *Chambers 21st Century Dictionary*. The winner of June's crossword puzzle is: John Ash from East Sussex.
This time, it could be you. Send your completed crossword to: '*PCW* August – Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive no later than 20 July 2000.
• Please state clearly on your entry if you do not wish to receive promotional material from other companies.

Solutions to July's crossword

ACROSS: 7 Full-duplex 8 Fire 9 Rebooted 10 Sector 11 Attach 13 Volumes 15 Decrypt 17 Hot link 19 Buffers 21 Kermit 24 Dialog 26 Transfer 28 Word 29 Mainframes

DOWN 1 Numerate 2 Almost 3 Rust 4 Glade 5 Axes 6 Groove 8 Factual 12 Caper 14 Ozone 16 Raffled 18 Nattered 20 Unison 22 Mislay 23 Strip 25 Game 27 Alfa

WIN fantastic Creative Labs DVD bundle

This month *PCW* has teamed up with award-winning manufacturer Creative Labs to give four lucky readers the chance to put our first ever DVD cover disc – or any other DVD – to good use, with a fantastic DVD bundle.

Not only could you win Creative Labs' PC-DVD Encore 8x to play your DVD collection but also its Desktop DTT 2500 Digital speaker system to bring superior Dolby Digital surround sound to your DVD experience. Creative Labs has also thrown in its Sound Works CSW200 speaker system for superb game playing.

The PC-DVD Encore has impeccable image quality, an easy-to-use control panel and, in addition to its stunning video capabilities, the Encore Dxr3 board will take Dolby Digital content and feed it to the Creative Labs Desktop Theatre 2500 for theatre-like audio. The Desktop Theatre includes a powered subwoofer, two identical front satellite speakers, two identical rear satellites, a centre speaker and the decoder amplifier.

A welcome addition to Creative Labs' DVD bundle is the Sound Works CSW200 speaker system, which will deliver a crystal clear and realistic audio experience for playing games when plugged into your Walkman, TV or small hi-fi system.

■ *For a chance to win one of these great DVD bundles, just answer the question below and follow the 'How to enter' instructions opposite.*

PCW August 2000 competition entry form

Name: .....

Email address: .....

Daytime telephone number: .....

Address: .....

.....

Answer: How many speakers does the Desktop Theatre 2500 have? .....

• *Please tick here if you DO NOT want to receive information about other products and services from VNU Business Publications Ltd* ❒

• *Please tick here if you DO want your details to be passed on to other carefully selected companies for marketing purposes* ❒

How many speakers does the Desktop Theatre 2500 have?
1) Five *2) Six* *3) Four*

Canon winners

The winner of June's Canon bundle is Mrs C Mercer. The two runners-up, J D Scott and Tim Porter, each win a BJC-8200 Photo printer.

How to enter

Fill in the coupon and send it to the following address by 30 July 2000:
Personal Computer World
VNU Business Publications,
32-34 Broadwick Street,
London W1A 2HG
Or email your name, address and daytime telephone number to us at pcw_competition@vnu.co.uk

Please state in your email if you DO NOT wish to receive information about other products and services from VNU Business Publications Ltd, and if you DO want your details to be passed to other carefully selected companies for marketing purposes.

◆ *Competition open to UK residents only.*

Rules of entry

This competition is open to UK readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, and Creative Labs. *PCW's* Editor is the sole judge of the competition, and his decision is final. No cash alternative is available in lieu of prizes.

Printers and Commodores steal the headlines, while Intel sets a challenge for Professor Nicely.

20 YEARS AGO August 1980

In 1980 a rippling Tarzan carrying a large printer adorned *PCW*'s front cover. This was not a tribute to the late Edgar Rice Burroughs but a reference to Mike Dennis' trek through the printer jungle. Too early for any sign of the inkjet or laser printer, it was the era of the dot matrix behemoth and we concentrated heavily on its mechanics.

Across the Atlantic Tom Williams reported from the third annual Rosen Research Personal Computer Forum in New Orleans. Here all the major players had gathered to contemplate the future of their companies and the industry as a whole. Apple's Steve Jobs envisaged that personal computers should be 'tools that amplify the natural capabilities of the human mind'. He said they should include general-purpose capabilities, such as data and word processing, and that the 'nuts and bolts' must be shielded from the user so that the machine itself recedes into the background. He could almost have been describing the iMac.

Moving on to software, Bill Gates was redefining the old slogan 'software sells hardware' into 'software defines the product'. Forward-thinking Tom considered how a major software house, such as Microsoft, could limit the possibilities of smaller firms trying to get a major part of the market.

Computer jargon was and still is a necessary evil, with more and more terms filtering into common usage. A new section, Newcomers Start Here, aimed to dispel the myth that 'microcomputing' was complicated. Thankfully some words are losing their relevance and most of us will rarely need to PEEK or POKE a memory byte these days.

15 YEARS AGO August 1985

As the Amiga A500 takes centre stage in August 2000's *Retro*, 15 years ago *PCW* first lifted the lid on the $1,500 Amiga A1000. Hovering on the front cover above the line 'The Biggest Splash Yet?' the Commodore Amiga was a prime candidate for our benchtest exclusive. Judging the magnitude of said splash was an excited Guy Kewney, who found at its heart an 8MHz Motorola 68000 supported by three specialised chips, intriguingly named Daphne (or Denise), Portia (or Paula), and Agnus. All had shared access to the Amiga's memory as well as split responsibilities. Daphne did the display animation and sprites and Agnus the animation graphics, while Portia was a peripheral scheduler and interrupt handler that also took over disk control. Guy concluded that for a machine running 10 times faster than any of its rivals, it was the first low-cost, multi-tasking computer to introduce a new price level to business computing.

The 'windows' interface was becoming increasingly popular back in 1985, so Nick Walker decided to put the main contenders, GEM, Windows and TopView, through their paces. TopView lost the battle because it was the most expensive and needed the most power. GEM and Windows, however, were difficult to separate as the latter was multi-tasking and had a virtual memory, whereas GEM was the most user-friendly. Nick predicted that it would be some time before a clear winner emerged.

Accompanying the year of the 'window' was the inevitable year of the 'mouse'. After reviewing several mouse-driven graphics programs we were still debating whether the mouse was just another superfluous peripheral.

10 YEARS AGO August 1990

Five years on, Commodore was again on the front cover. This time it was the £699 Commodore Dynamic Total Vision or CDTV. Aimed at the mass market this 'precursor' to the DVD or laser-disc player, was supposed to set the home-entertainment industry on fire. In fact it was a dressed-up A500 (Agnus, Paula and Denise included) together with a CD-ROM. Limited by the 150Kbytes/sec drive and decompression processing power, full motion video playback was not possible. Instead the CDTV's marketing concentrated on what Commodore termed 'Edutainment' where navigable static images and text were mixed together with audio. Sadly it didn't really take off, with problems in defining a software standard and the advent of the Internet not helping.

As today's technology includes new applications for fractal compression (News, p39), a decade ago Dr Nick Beard was taking an in-depth look at the emerging fractal and chaos theories. From exploring the possibilities of predicting future behaviours of chaotic systems by using 'taught' neural nets, we could also learn of the alleged application of fractal mathematics in generating realistic scenery in *Star Wars*. By far the most impressive application of fractal theory was a demonstration of Michael Barnsley's compression system with a 45-second video sequence packed onto a 1.2MB floppy. The applications of such technology were obvious and it consequently had a massive impact on the video and imaging industries.

5 YEARS AGO August 1995

Taking a five-year stroll down memory lane, we find that colour printers were flavour of the month. After testing 20 models, it was the Kodak XLS 8600PS that ran away with the best print quality accolade. This was to be expected, as it was far from cheap. At £6,995 for the Postscript version this thermal dye diffusion printer could also add a laminate coat after the CMY process to prevent fading. For those who didn't have a few thou' burning a hole in their pockets, the Lexmark WinWriter 150c was the Editor's Choice. It produced astonishing colour and mono output at impressive print speeds – all for £299.

Four months after the last CD-ROM round-up, Gordon Laing took another seven quad-speeds for a spin. With IDE the *de facto* interface it was hard to filter out a winner, and it was more a question of brand loyalty and availability.

As for PCs, the Pentium133s were the latest speedsters to hit our Features section. *PCW* tested five models and we were impressed by each of the entrant's overall performance increase compared with the 120MHz Pentiums of old.

Speaking of older CPUs, remember the Fdiv bug? This was the flaw in Intel's Pentium that occasionally affected its ability to work out sums. Discovered by the unforgettably named Professor Nicely this issue's Newsprint told how Intel had retaliated by challenging the Professor to find fault with the new P6 chip.

JALAL WERFALLI

Commodore Amiga A500

The first computer to truly match the coin-op kings of gaming has had a rough ride over the years.

Those who grew up in the 1980s and loved video games were truly spoiled. They had a heap of machines available to them, including the Sinclair Spectrum, BBC Micro and Commodore 64. However, while the efforts of coders were commendable, the games on the market were limited by the hardware available and were hardly arcade perfect. Limited animation and colour clash were annoyances that had to be tolerated, that is until the entry of the Amiga A500 in 1987.

The story of the Amiga, like most of the great products that made their mark on the history of computing, is long and complicated. Some would even argue that it's a bit early to be covering the Amiga in a *Retro* column.

The Amiga legend begins in 1980 when computer design guru Jay Miner decided he wanted to create a next-generation games console. Miner had already developed the Video Computer System (VCS) for Atari, which had ended up in millions of homes.

However, it wasn't until 1982 that the team behind the Amiga really started to come together. Larry Caplan, who was working for Activision, but had previously worked at Atari as a programmer, called up Miner and suggested they start their own company. Miner had previously been friends with Dave Morris, who was now running his own company called Hi-Torro which made games and joysticks for the Atari 2600. Miner got in contact with him and told him of his plans. Morris was keen to get involved and the three agreed to look for funding.

It was the investors who weren't keen on the Hi-Torro name and, seeing as they were stumping up £4.375m, the name was changed to Amiga – meaning 'female friend' in Spanish – a moniker that Miner was not originally keen on.

Miner then recruited three more engineers to help him with the design of the Amiga – RJ Mical, Dave Morse and Carl Sassenrath. The Amiga team was now complete.

By 1984, the company was fast running out of its reserves of cash, even though the machine – which had been codenamed 'Lorraine' after Morris' wife – was almost ready. The custom chips weren't finished, but the team built hardware simulators called bread boards to handle the functions of the custom hardware. It was in this form that the Amiga debuted at the CES show in Chicago. The reaction was amazing as the crowd was wowed by the bouncing red and white sphere demo now famous as the Amiga logo. After an initial loan of £625,000 from Atari for further development, it was finally Commodore that stepped in, repaid the Atari loan and then bought the company outright in August 1984.

The Amiga was supposed to take on IBM and Apple, but it really excelled at games

By this time the bottom had fallen out of the games market and Commodore decided that the Amiga should become a fully functioning home computer. The product debuted as the Amiga A1000 in 1985, but it wasn't until the cheaper A500 was released in 1987 that people started to take notice.

Priced at £599, the Amiga A500 featured a 16bit Motorola MC 68000 processor clocked to 7.16MHz and 512KB of RAM. It could be connected to a TV, so an expensive monitor was not required, although the modulator did stick inelegantly out of the back of the unit. Despite Commodore's aspiration to take on IBM and Apple, the Amiga's arch-enemy became the Atari ST.

The Amiga's power came from its custom chips named Paula, Denise and Agnus (named after women to prevent them being leaked during development). Paula controlled the sound and input/output, Denise was the display controller and Agnus was the address generator. The Amiga could display 32 colours at 320 x 256 or 320 x 512 and 16 colours at 640 x 256 and 640 x 512. There was another display mode, using a technique called HAM (Hold And Modify) that allowed the Amiga to display a static image utilising the full 4,096-colour pallet. The device had impressive sound capabilities, too, with its 8bit, four-voice, stereo sound.

The Amiga captured the imagination of games developers, as its hardware let them do things only previously possible on expensive coin-op boards. Notable games of the time were Shadow of the Beast II (featuring 13 levels of parallax scrolling), Bubble Bobble, Pang, Flood, Beach Volley and Speedball II.

The A500 became the most popular of the Amiga product line, winning the award for computer of the year on more than one occasion. Unfortunately, none of its successors was anywhere near as successful and by 1994 Commodore's luck had turned and on 29 April it filed for voluntary liquidation.

Hopes for the Amiga were raised in 1995 when PC retailer Escom purchased the rights to the Amiga. However, a little over a year later, after expansion of its PC business into the UK market, Escom filed for bankruptcy. The Amiga's fate was once again uncertain. Until as late as last year the rights to Amiga were held by Gateway, but on 31 December 1999 it offloaded the Amiga brand to Amino for an undisclosed sum. Whatever shape the next Amiga takes, it will have a tough task living up to the success of the A500.

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